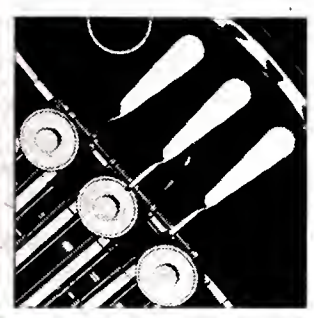
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

$2.00 A COPY; $44/YEAR | AUGUST 26, 1985 | VOL. XIX, NO. 34



Creating harmony in the DP shop
Special Report on software productivity

Super machines
Part Two of the annual Hardware Roundup/**27**

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Millennium gets a boost

M&D previews accounts receivable at World '85

By John Desmond
CW Staff

BOSTON — Applications developers are offered more power to edit screens, get help and issue commands with McCormack & Dodge Corp.'s enhanced Millennium on-line applications development system announced at the World '85 users conference here last week.

Also, users awaiting M&D's accounts receivable package were placated by the company's preview of AR:Millennium, its first major application developed using Millennium. The product is scheduled for controlled release in October and general release in December at a price of $95,000.

Several of the M&D users inter-

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AT&T cuts 24,000 jobs

By Peter Bartolik
CW Staff

MORRISTOWN, N.J. — AT&T, in its largest consolidation since the divestiture of the regional operating companies, last Wednesday announced plans to eliminate 24,000 jobs from its Information Systems group. The company said its computer operations division will not be affected.

AT&T's move to slash the group's total work force by 20% was not unexpected [CW, Aug. 19] and was seen by analysts as part of an overall company strategy to improve profit margins on digital telephone switching equipment. This move, analysts said, would help AT&T blunt competitive pressures and counter a recent flattening of sales.

The cutbacks were announced by Information Systems Chairman and Chief Executive Officer Robert E. Allen in a nationwide telephone address to employee groups. He said the consolidation is only

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IBM turns to Microsoft on systems code

By Clinton Wilder
CW Staff

Formalizing a partnership that set the standard for business microcomputers, IBM and Microsoft Corp. last week signed an agreement to develop jointly future operating systems and systems software products. The pact ensures that Microsoft will play a major role in IBM's efforts to integrate the Personal Computer with its varied product lines.

Both companies declined to discuss specific products covered by the agreement, but analysts said they believe the firms will work together on Microsoft's anticipated Version 4 of MS-DOS and other future offerings. The announcement appeared to calm fears that IBM might adopt a proprietary operating system and thereby lock systems and applications software vendors out of its next microcomputer bonanza.

"The agreement puts to rest whatever questions remained about IBM moving away from DOS," said Michele Preston, an IBM analyst at L. F. Rothschild, Unterberg Towbin. "They have said it, but everyone kept [disbelieving] it. Anyone who still feels that way now has his head in the sand. It's very positive for the industry."

Although the deal does not involve the acquisition of Microsoft equity by IBM, it continues the recent pattern of IBM's joint arrangements with leaders in high-tech fields. Among these have been vendors of long-distance services (MCI Communications Corp.), communications switching equipment (Rolm Corp.) and semiconductors (Intel Corp.).

The financial terms and specific length of the agreement were not revealed, but it represents the largest contract ever signed by the Bellevue, Wash.-based company. Micro-

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123V2. Lotus Development drops its key disk requirement in the next version of 1-2-3 and offers some support for IBM's PC Network. **Page 6.**

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Data General, competing with DEC, offers a product with hooks to IBM's Distributed Office Support System messaging architecture. **Page 6.**

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Is that the phone? IBM unwraps modems for its Personal Computer and jumps into the competition in another marketplace. **Page 7.**

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On the road again. *Computerworld* reports on last week's conferences — IJCAI, Info Center and World '85. **Pages 10-16.**

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Quick service. TRW bids for Datapoint's month-old maintenance spin-off, Intelogic Trace. **Page 79.**

■

Artificial intelligence: On the road to reality

ANALYSIS

By Eric Bender
CW Staff

LOS ANGELES — Last week's International Joint Conference on Artificial Intelligence, which drew roughly 6,000 attendees here, marked further milestones on AI's path from research and development to the marketplace.

Among these were the heightened presence of major computer industry players, price/performance boosts for dedicated AI workstations, further moves toward standards such as the Common Lisp dialect, an increased emphasis on linking AI software with traditional computing environments and signs of an upcoming deluge of AI-based software for the real world.

The conference sessions, with their traditional emphasis on highly technical advances in the art and science of AI, were well attended. IJCAI's commercial side had a much higher profile than in previous years, with the exhibit floor often too jammed for attendees to walk freely.

Fifty-seven vendors exhibited, all with professional-looking booths — a far cry in numbers and polish from last year's American Association for Artificial Intelligence show in Austin, Texas. However, as is usual for AI shows, many vendors continued development work until the last minute before the doors opened, and there were noticeably more software bugs than is typical in products demonstrated at mainstream computer conferences.

IBM's new offerings of Prolog and expert systems development tools for VM environments drew a great deal of attention, with showgoers noting that they expected Big Blue to fill its traditional role of blessing the technology and expanding the market. But many commented that the IBM products do not push the limits of AI technology and suggested that the introductions represent a holding pattern designed to keep IBM customers from straying, rather than an aggressive thrust into AI.

As one sign that AI-based software is being readied for widespread commercial use, IJCAI saw increased attention focused on the issue of what kinds of workstations will act as AI delivery vehicles.

Currently, companies that buy AI products "are hard pressed to find anything that meets their needs," according to Larry Geisel, president of Carnegie Group, Inc., an AI software firm. Dedicated Lisp machines are expensive and in scarce supply at customer sites, and they typically lack tight integration with mainstream computing environments, Geisel said. As corporations move toward actual deployment of AI-based systems, the lack of suitable delivery workstations is a growing worry, he maintained.

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HP's European sales dip 20%

Foreign market slump might spell bad news for U.S. vendors

By Clinton Wilder
CW Staff

PALO ALTO, Calif. — For U.S. minicomputer vendors counting on continued growth in European markets to offset stalled demand at home, last week's quarterly financial results from Hewlett-Packard Co. could represent a troubling black cloud on the international horizon.

HP reported that its overseas sales unexpectedly fell 20% in the quarter ended July 31, with most of the decline coming in Europe. "While we began to see international order growth moderate several months ago, the sharp decline was greater than we anticipated," said John Young, HP's president and chief executive officer, in a prepared statement.

Young's observations echoed remarks made by corporate executives and analysts last fall, after HP's fourth quarter of fiscal 1984 showed a sudden softening of domestic orders [CW, Nov. 26, 1984]. Because HP's quarterly reporting schedule runs two months ahead of those of most companies, its results last year represented early indications of declining U.S. sales for other vendors and of the worst computer industry downturn ever.

"I don't think HP is the only company going through this; I think we'll see it across the board," said James Reynolds, a market analyst with Dataquest, Inc., a market research firm based in San Jose, Calif. "The European market tends to lag behind the U.S. [market], and the slump in the buying patterns of large corporations is just beginning to take hold there."

Dennis Rainey, the Geneva-based finance director for HP's European operations, said foreign buyers are more cautious about new computer technologies, creating a buying pause at an earlier point in the market's maturity cycle.

"Many of our customers have indicated a preference for waiting to see what the new technologies, particularly in networking, will do," Rainey said. "In the U.S., the prevailing cultural attitude is that we can do anything and it will turn out all right. [European buyers] look at things more skeptically, perhaps more hard nosed' in a business sense. They're using more scrutiny a little earlier in the cycle."

Rainey declined to speculate on HP's European results as a bellwether for its competitors but said, "Looking at it from the outside, you'd have to say that the same economic and technical issues will affect others as well."

Overall, HP's third-quarter earnings fell 13% from the year-earlier period. The business and scientific computer maker posted profits of $117 million, or 45 cents per share, compared with $134 million, or 52 cents per share, a year ago. Revenue during the quarter slipped 3%, from $1.68 billion last year to $1.48 billion.

The plunge in HP's overseas sales comes at a time when the strong U.S. dollar's extreme pricing pressure on foreign buyers has begun to ease. But the dollar's recent weakening has only added to customer uncertainty, Rainey said. HP is adjusting European prices on a continuing basis with the unpredictable exchange rate situation, he added.

In addition to shrinking margins for U.S. vendors, the previously strong dollar helped European computer makers become increasingly competitive in continental markets outside their native countries. Firms such as West Germany's Nixdorf Computer AG, Italy's Ing C. Olivetti & Co. and Norway's upstart Norsk Data AS are fighting and winning more and more account battles in the lucrative French and British markets. "Local sourcing makes it easier for local vendors to gain market share," said Philip DeMarcillac, an analyst with market research firm International Data Corp.'s IDC Europa in London.

Rainey noted that the 1% to 1.5% growth of the overall European economy this year has been significantly less than the 2.2% to 2.5% rate anticipated. The sluggishness has been most acute in technology-oriented sectors such as the British and French defense industries.

IBM, too, looms as a major factor for U.S. mini vendors in Europe. "The [IBM] System/36 is part of the problem because it blocks the low end," DeMarcillac said. "Buyers believe IBM will come out with a good upgrade path for it, and its sales have boomed over the last 12 months. The $15,000 to $50,000 market is the key area at the moment."

That is where major players like HP, Data General Corp., Digital Equipment Corp. and Wang Laboratories, Inc. have sought to leverage European sales against the slumping demand on this side of the Atlantic. But if the European market follows the pattern foreshadowed by HP's dip in domestic orders last fall, the U.S. minicomputer industry may be in for a whole new round of tough times.

"In the mini field, HP has been an accurate gauge," said Dataquest's Reynolds. "I think we may see a whole different set of expectations now."

In a separate announcement last week, DG said it will shut down four manufacturing facilities this week. Company spokesman Ed Russell said manufacturing operations will be halted this week at Westbrook, Maine; Austin, Texas; Sunnyvale, Calif.; and the Clayton, N.C., assembly and test facilities.

Operations will continue at other facilities, but the Sunnyvale facility will be shut down for four additional days next week.

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A state bank is using communications equipment from start-up Doelz Networks to aid its migration to a new CPU vendor/**8**

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Random access

On a visit to DEC manufacturing plants recently, plant managers indicated that the company is working on clustering capabilities for its Microvax II desk-size minicomputer. Since the Microvax II is basically a VAX-11/780 in a small box, what would then happen to the VAX-11/780? Ken Olsen, president of DEC, said the smaller machine does not need clustering capabilities, and as far as he knows, no clustering effort is under way for the Microvax II.

■

Will IBM unveil a 32-bit, VM/CMS-based, single-user, under-$10,000 microcomputer in the first quarter of 1986? Well, according to Meldon Gafner, recently appointed president of Integrated Software Systems Corp., IBM will have to if it hopes to get the micro buying spree going again. Gafner said Big Blue needs a system like DEC's Microvax II that allows users to run their host applications on the desktop without modification. The Issco president said mainframe VM applications currently require reworking to run on IBM's existing VM-capable micros. "IBM needs something to tie everything together. Users don't want to have to reengineer their applications to run on the [Personal Computer AT]. That just adds to the backlog. They have to get the VM/CMS unit out there to pull out of the slump."

■

Henco Software, Inc. next week will unveil a version of its Info relational data base management system for the Data General Eclipse/MV series of computers. A company spokesman said Henco plans future releases of its PCInfo package for the Data General/One and DG's recently announced Dasher/One personal computer.

■

McCormack & Dodge announced Version 2 of Millennium, the company's real-time mainframe applications development system, at the M&D users conference in Boston last week. Version 3 of Millennium, now being developed, will have interfaces with IBM's SQL language and DB2 data base management system embedded in its code, according to Robert Kelley, M&D's vice-president of product strategy. Kelley called the effort to use DB2 "an important technological direction for the company." He acknowledged that "how fast we move on that depends on how fast IBM makes DB2 credible."

■

In personal computer software, McCormack & Dodge will concentrate on developing distributed processing applications of Millennium. "When we started this, we didn't like the idea of a mainframe system on a [personal computer]," according to Robert Kelley, M&D's vice-president of product strategy. "But we've found there are things that make sense to do on a [personal computer] with Millennium." Kelley said M&D has no plans for personal computer-based applications, at least until work is completed on Version 3 of its Interactive PC Link.

■

Only a small difference exists between the lock-and-key software protection proposal published by the Association of Data Processing Service Organizations, Inc. (Adapso) in December and the specification that has resulted from the ensuing months of study by members of the organization. That difference is the use of a one-prong key, not an eight-prong connector as originally suggested, a source within Adapso said. The key, without which software protected by the scheme will not run, will fit into a ring attached to the personal computer's serial port. It will be included with software protected under the scheme and will add about $2 to $6 to the cost of each package, the source said. The specification will likely be unveiled this month.

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one of many actions that are being taken to improve profits. Allen also said that further consolidations are likely and market conditions could lead to further cutbacks.

According to Kenneth M. Leon, an industry analyst with the New York investment firm of L. F. Rothschild. Unterberg Towbin, Allen's remarks concerning more cuts reflect uncertainty about market conditions over the next 12 to 18 months and "indicate a worst-case scenario of a recession."

The company said it has already identified 7,400 surplus jobs and has notified those employees of options available to them. Other affected employees "will be notified by mid-September if they are in surplus jobs," spokesman Tom Holub said. Affected employees will have the option of accepting financial incentives, including enhanced pension programs, or seeking transfers to other jobs within the AT&T organization, he said.

According to Roland Pampel, vice-president of systems marketing and development for AT&T's computer systems division, the layoff is an attempt by AT&T to streamline the company and eliminate unnecessary positions. "It's part of becoming a commercial business," he said.

Holub said the company was not able to estimate how many of the affected employees could find jobs in other areas and how many will eventually be laid off or retired. The cutbacks will cost between $800 million and $900 million this year but will reduce expenses next year "by hundreds of millions of dollars," he said. Reserves established prior to divestiture will absorb the costs this year, according to Holub.

The consolidation follows a July 1984 cutback of 11,000 positions at AT&T Technologies, the operating arm — one of two — under which AT&T Information Systems falls, and the June 1985 announcement of the elimination of 1,600 positions at AT&T Information Systems.

L. F. Rothschild's Leon said AT&T's new digital phone switches are being well received, but sales of those products are not offsetting the impact of customer conversion from analog to digital systems and the added pressure of a declining lease base. AT&T's 3B minicomputer line "is a little pricey" compared with competing products, but a soon-to-be-released 3B20C — which won the company a $946 million contract with the National Security Agency recently — "will be a little more competitive," Leon said.

According to both Leon and Kathryn Korostoff, an analyst with Northern Business Information, a New York-based telecommunications market research firm, the move was important to boost AT&T's profit margins. "This should give AT&T more room to cut costs," Korostoff added. Both analysts agreed that the jobs being eliminated are surplus positions that will not impact the company's ability to compete in the telephone and computer equipment markets.

Leon said that second-quarter sales of phone switches targeted at the office market were flat compared with first-quarter sales. But AT&T's Holub claimed that sales of the company's System/75 mid-size private branch exchange doubled in the second quarter compared with the first. Holub also reported a 35% increase in System/85 sales and a 20% increase in Merlin sales. Additionally, sales of the PC 6300 personal computer were up 60%, Holub said.

The jobs already identified as surplus were in the following divisions: 1,100 in the large business systems organization and 2,300 in the general business systems organization, both of which supply PBXs; and 4,000 in the consumer product organization, which markets residential phone equipment. Some of the consumer product cuts had previously been announced when AT&T said earlier this month it was closing a Shreveport, La., facility and replacing that factory's output of consumer phones with off-shore manufacturing resources.

Of the 24,000 jobs to be eliminated, 30% are classified as management positions, Holub said. Cutbacks will affect about 15,000 sales and support positions nationwide, 4,000 installation, maintenance and other technical support jobs, 3,000 product distribution positions and the 2,000 hourly workers at the Shreveport factory.

Following the consolidation, AT&T Information Systems will have approximately 93,000 employees nationwide.

IBM ships 3090s in volume

RYE BROOK, N.Y. — IBM last week announced it has officially begun volume shipments of its 3090 Model 200 mainframes.

The first non-beta-site user of the system is Texaco. The 3090 will be installed at the the company's Bellaire Complex in Houston, IBM said.

First volume shipments of the 3090 Model 200, a two-CPU processor complex, are running about three months ahead of the schedule IBM originally announced when it unveiled the 3090 in February [CW, Feb. 18].

The improvement in the delivery schedule is believed to be an attempt by IBM to boost third- and fourth-quarter revenues in efforts to balance lower than expected earnings in the first and second quarters.

The 3090 is IBM's top-end mainframe series, the successor to its 3080 line. A second model of the 3090 line, a four-CPU Model 400, is not scheduled for availability until the second quarter of 1987. Many industry observers believe IBM will improve the delivery schedule on that processor as well. IBM is also expected to unveil a uniprocessor version of the 3090 within the next year.

The 3090 models use emitter-coupled logic circuit technology as opposed to the transistor-transistor logic circuits used in the 3080 series. The 3090 machines are the first IBM mainframes to use the company's 288K-bit memory chips. The 3090 Model 200 is said to offer roughly the same internal perfomance as the four-processor 3084 Model QX processor complex but at a much lower price. A 3084 Model QX costs roughly $6 million, while a 3090 Model 200 costs about $4.6 million.

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soft, the world's second largest micro software company behind Lotus Development Corp., is the developer of the MS-DOS operating system for the IBM Personal Computer, and Xenix, a Unix variant used on the Personal Computer AT and other systems. Microsoft said it is free to license products jointly developed with IBM to IBM-compatible and other manufacturers.

In anticipation of the agreement, Microsoft Vice-President of Systems Software Steve Ballmer said, the firm doubled the size of its systems software development group.

"This gives us a very clear opportunity inside IBM," Ballmer said. "It will enable us to hear openly about IBM's plans in some areas where it may have been difficult for us before."

Makers of IBM-compatible computers, or clones, welcomed the agreement as a boost to the overall industry. "If this means an advancement in technology, then we are all going to benefit," said Gail Soles, a spokeswoman for Corona Data Systems, Inc., a Westlake Village, Calif.-based maker of Personal Computer compatibles. "IBM comprises only about 10% of Microsoft's business, so Microsoft is going to continue to have to address the rest of us."

"I think IBM realizes there are other companies in the industry, like Microsoft and Lotus, that have quite a bit of talent and resources to offer," said Richard Levandov, vice-president of marketing at Phoenix Software Associates, Ltd. in Norwood, Mass., a manufacturer of compatibility tools. "IBM doesn't want to change the formula of working with an array of third-party companies."

Last week's announcement cemented a relationship that began in 1980, when IBM endorsed the MS-DOS operating system for what would become the world's standard microcomputer. That partnership will now continue on an even closer, more formalized basis.

"The agreement is really not surprising," said Frank Gens, an IBM analyst at the International Data Corp. in Framingham, Mass. "IBM can't afford to walk away from the DOS standard. In that sense, IBM is a slave to the industry standard that it has set."

CW Staff Writer Maura McEnaney contributed to this report.

CORRECTIONS

The Wang Laboratories, Inc. chart in the Aug. 19 Hardware Roundup incorrectly listed the VS85 cache memory capacity. The correct number is 32K bytes. Also, several prices in the IBM mainframe charts were inaccurate. The corrected figures are 3083 Model BX (16M), $1,155,000; 3083 Model JX (32M), $1,850,000; 3081 Model GX (16M), $2,190,000; 3081 Model KX (16M), $2,610,000; 4381 Model Group 3 (8M), $775,500; 4381 Model Group 2 (4M), $460,000; and 4381 Model Group 1 (4M), $340,400.

Second-class postage paid at Framingham, Mass., and additional mailing offices.

Computerworld (ISSN-0010-4841) is published weekly, except: January (5 issues), February (5 issues), March (5 issues), April (6 issues), May (5 issues), June (5 issues), August (5 issues), September (7 issues), October (5 issues), November (5 issues), December (5 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., 375 Cochituate Road, Box 880, Framingham, Mass. 01701.

Computerworld can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

ISSN 0010-4841/85 $3.00 + $.50. $2.00 a copy: U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

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Updated 1-2-3 drops key disk, supports PC Network

By Edward Warner
CW Staff

CAMBRIDGE, Mass. — The enhanced version of Lotus Development Corp.'s 1-2-3 spreadsheet, due to ship in September, will remove the "key-disk" requirement for operation with hard disk drives and will provide limited support for the IBM PC Network, Lotus said last week.

Currently, 1-2-3 users with hard disk drive systems must insert a system disk into the A drive of their personal computers each time they use the program. The new version avoids that requirement, allowing the machine to boot from the hard disk drive, Lotus said. Users will be able to install the software on one hard disk drive at a time and to deinstall the product for use on another machine if that becomes necessary. A backup system disk also will be provided with each package of 1-2-3 Release 2.

A version of Symphony 1.1 that avoids the key-disk requirement will be offered this fall, available free to current users, the company said. Future Lotus products also will support that capability, the company said.

For users of 1-2-3 Release 2, PC Network support will mean the ability to read and write to 1-2-3 files that are stored on the local-area network file server. It will not mean the ability to share 1-2-3 among network users, however. Network support was not one of the features originally announced by Lotus in April when the company said it would enhance 1-2-3. Lotus said local-area network support was added at the request of users in large corporations, the market segment to which two-thirds of Lotus' sales go.

Limited local-area net support meets half the demand

In reaction, Paul Cubbage, senior industry analyst at Dataquest, Inc., a market research firm in San Jose, Calif., said the inclusion of even limited local-area network support answers half of the demand from corporate microcomputer managers for a local-area-network-compatible version of 1-2-3.

Cubbage said the other half of the demand is a version of 1-2-3 that can be shared on the network, something that he said will require the establishment of a site licensing program by Lotus. Overall, he said the release of 1-2-3 is "a nice evolutionary step" for the product.

The top-selling Lotus spreadsheet will remain priced at $495 when Release 2 arrives. Users who purchased the current version of the software, Release 1A, after April 24 will be able to upgrade to Release 2 for free. Registered users who bought the version before April 24 will be charged $150 for the upgrade.

Included in the enhancement, the product's first in two years, are such features as the ability to access up to 1M byte of additional memory and support of the Intel Corp. 8087 coprocessor, which works with the IBM Personal Computer's standard microprocessor to speed calculations.

Another feature of Release 2 introduced by Lotus was the addition of string functions for use with both text and mathematical formulas. A string function would allow users to search the spreadsheet for a name rather than only for a number.

The string function was one of the few new features of Release 2 that interested Alan Gross, president of the New York-based Microcomputer Managers Association. Gross, microcomputer manager for a New York investment banking firm, said that access to expanded memory is "of some importance to 5% or 10% of our user body," and network compatibility will affect no more than about 5% of personal computer users in most firms.

To improve further 1-2-3's use in reports, Lotus said, it will exclusively market the $150 1-2-3 Report Writer, written by Concentric Data Systems, Inc., of Westboro, Mass. A Lotus spokeswoman said the marketing of Report Writer marks the first time that Lotus has sold another vendor's software.

Report Writer, demonstrated along with 1-2-3 Release 2, will ship at the same time as does 1-2-3 Release 2, Lotus said.

DG adds link to Disoss, giving weight to IBM standard

By John Dix
CW Staff

WESTBORO, Mass. — Following the lead of Digital Equipment Corp., Data General Corp. last week announced it will support IBM's messaging architecture, a move that further promotes that architecture as a de facto industry standard.

DG's CEO Document Exchange Architecture (DXA) is the company's link to IBM's Distributed Office Support System (Disoss).

DXA, being released in two phases, will eventually enable users within DG's Comprehensive Electronic Office (CEO) environments to take advantage of Disoss document distribution and library services, according to communications products manager Joe Clabby.

The first phase of DXA provides an interface to IBM's Document Content Architecture (DCA) and Document Interchange Architecture (DIA), Clabby said.

DCA and DIA dictate, respectively, how messages and documents are structured and exchanged between computers.

By providing a connection to DIA and DCA, DG's DXA will provide mail and document distribution capabilities, the manager said.

DXA does not yet provide the integrated method to store, search and retrieve documents from Disoss libraries available with DEC's recently announced External Document Exchange with Disoss software [CW, July 15].

The only way to do that with DXA today is through emulation of an IBM 3270 display station.

In its second release, scheduled for the first quarter of 1986, DXA will be enhanced with an integrated Disoss link that will make an MV system look like an IBM network node.

"In phase two, we will better integrate the [Disoss] library function into the product, add [IBM] Physical Unit 2.1 support, expand the [IBM] Logical Unit 6.2 to the optional verb set and add [IBM's] Systems Network Architecture Distribution System support," Clabby said.

Translated into application, this will enable users on MV systems to access Disoss as if it were an IBM node and use all Disoss library functions, analagous to using a real library.

To implement DXA, users need to add a DG Intelligent Broadband Controller (IBC) to their DG Eclipse MV system in addition to the CEO DXA software.

The IBC intelligent synchronous board, which is installed internally, provides the IBM link, but the necessary transmission code conversions are done by the MV processor, Clabby said.

The IBC costs $6,500. The CEO DXA for the Eclipse MV/4000 DC and MV/4000 SC computers and DS workstations costs $1,500. For Eclipse MV/4000, MV/8000 and MV/8000 II computers, the CEO DXA costs $5,000. For Eclipse MV/10000 and MV/10000 SX computers, the cost is $6,500.

The first phase of DXA is available 90 days after receipt of order.

DG is located at 4400 Computer Drive, Westboro, Mass. 01581.

Bug found in Ultrix Microvax II

By Maura McEnaney
CW Staff

MAYNARD, Mass. — Just one month after its fanfare-filled introduction of the Microvax II, Digital Equipment Corp. stopped shipping versions of the machine running the Ultrix 32M operating system. The shipments were halted in June, after the company discovered problems with the machine's parity checking capabilities.

A spokesman for DEC said the company is currently working to find the source of the bug, which appears to be limited to Ultrix-based versions of the workstations. It is not known when shipments will resume. VMS-based Microvax shipments and the Ultrix-based Microvax I are not affected by the problem, the spokesman said.

John Forde, Microvax product manager in DEC's micro systems development group, told *Computerworld* that approximately 50 of the Ultrix Microvax II machines had been shipped when the company discovered the bug. The problem was present in five of the 50 machines and was occurring "every couple of days," he said.

According to Forde, "What appeared to be a failure in the operating system was a failure in the hardware but only under the Ultrix environment." The combination creates a memory parity bit error that requires users to reboot the machine and clear the system. "It appears that either the code sequence or the interaction of the code with the hardware creates a glitch in the machine." When that occurs, Forde said, the machine indicates that it will stop running.

DEC is working with users to pinpoint the problem, Forde said.

DEC's Ultrix operating system is based on the University of California at Berkeley's Unix 4.2.

NEWS

IBM enters micro communications mart with modems

By Edward Warner
CW Staff

RYE BROOK, N.Y. — IBM introduced two low-speed modems last week that will put the computer giant in direct competition with companies such as Hayes Microcomputer Products, Inc. that have staked out the micro communications market.

Both IBM modems support full-duplex, asynchronous communications at speeds up to 1,200 bit/sec., and one also offers synchronous communications capability.

Although such products have been available from outside vendors since the IBM Personal Computer was introduced four years ago, this is the first time that IBM has offered its own modems for its machine.

IBM also announced discounts of 15% to 25% on high-volume Personal Computer maintenance agreements and a graphics-compatible version of the IBM Quietwriter printer.

Challenge to Hayes

IBM's belated entry into the Personal Computer modem market challenges longtime market leader Hayes of Norcross, Ga. An IBM spokesman said both modems are Hayes-compatible and can be used with Hayes Smartcom II communications software as well as with other non-IBM communications software packages, including Microstuf, Inc.'s Crosstalk XVI and Transporter and Dow Jones & Co.'s Dow Jones Market Analyzer, Dow Jones Market Manager and Dow Jones Spreadsheet link.

Although IBM introduced an internal modem for its PCjr when that ill-fated product debuted two years ago, the new modems, one external and one internal, mark Big Blue's first such offerings for its Personal Computer line.

In all, "the [IBM] strategy with Personal Computer modems is very similar to [its] strategy with mainframe modems," said John McCarthy, research manager for Forrester Research, Inc., a Cambridge, Mass., market research firm.

In both markets, he said, IBM was late to enter and offered a product that neither broke technological ground nor was priced less than the offerings of competitors. Prices of the IBM modems, he said, are nearly equal to those of the 2,400 bit/sec. modems for the Personal Computer being marketed by outside vendors.

IBM declined to comment regarding the products and prices of other modem makers.

The 5841, costing $609, is available immediately and reportedly supports both synchronous and asynchronous communications at either 600 or 1,200 bit/sec. A stand-alone unit, it interfaces with the Personal Computer and the IBM 3161 and 3163 Ascii display stations.

IBM said the 5841 has been tested for compatibility with the following IBM software for mainframe communications: Systems Network Architecture (SNA) 3270 Emulation, SNA Batch, Binary Synchronous 3270 Emulation and Display Communications Binary Synchronous Communications.

The other modem introduced, the IBM 1200, reportedly fits into an expansion slot inside the Personal Computer or the Personal Computer XT or AT. Priced at $495, the asynchronous modem will be out in September.

Both modems reportedly offer automatic speed detection — the ability to adjust to the speed of incoming data — as well as automatic detection of dial tones and busy signals and automatic line equalization, under which signal distortion is monitored and shared equally between transmitters and receivers as line conditions change. Self-diagnostics are built in, as are automatic redial and automatic dialing or manual dialing capabilities.

Also among the announcements were changes in the way that IBM will market service contracts for its Personal Computer and related hardware.

Foremost among these changes was the introduction of a Volume Maintenance Amendment, under which service contracts for 150 to 499 Personal Computers would receive a 15% discount. In addition, service contracts for 500 to 1,000 Personal Computers would get a 20% discount, and contracts for more than 1,000 Personal Computers would receive a 25% discount.

Among the other machines covered by the amendment are the Personal Computer XT, Personal Computer AT and the 3270 Personal Computer.

In another service-related move, IBM increased from nine to 32 the number of non-IBM personal computer hardware products that its national service organization will support, adding to the list such machines as Amdek Corp.'s Video 300 and 300A monitors and a variety of option boards from Tecmar, Inc.

The IBM Quietwriter Model 2 printer, meanwhile, reportedly offers the same features as the Quietwriter Model 1 but with all-points-addressable graphics capabilities. The printer, for use with the Personal Computer and other personal computers, prints graphics and text on standard paper. Priced at $1,595, it is available immediately.

IBM's Information Systems Group is located at 900 King St., Rye Brook, N.Y. 10573.

Seattle bank implements network overhaul

Upgrade eases switch in mainframe vendor

By John Dix
CW Staff

SEATTLE — The largest state bank here has completed testing communications products from start-up Doelz Networks, Inc. and is forging full steam ahead to install the technology throughout its network.

Seafirst Bank, the largest and one of the earliest customers of Doelz, is using the equipment in a major network overhaul to accommodate net growth and pave the way for new ventures, according to Timothy E. Turnpaugh, senior vice-president of Seafirst's operation technology division.

Besides playing a pivotal role in Seafirst's ambitious networking plans, Doelz's virtual circuit technology is providing an important ancillary benefit; it is greatly facilitating the bank's migration to a new mainframe vendor.

Seafirst will use Doelz's Elite One communications processors to upgrade its 167-branch statewide network. This is no menial task. The network supports processing minicomputers and terminals in each branch, 155 automatic teller machines and roughly 1,000 retail point-of-sale (POS) devices.

The overhaul is being made even more difficult by two other factors — Seafirst's central data center migration from Honeywell, Inc.'s processors to an IBM 3084 Model Q and the installation of Tandem Computers, Inc.'s processors to support ATM and POS terminals. The Tandem units will serve as front-end units to all ATM and POS devices and provide a gateway into the Northwest Electronic Network, a net consortium for POS and ATM terminals in which major Northwest banks are participating.

This was the design problem Seafirst faced: design a network that would facilitate future ventures and support disparate types of devices in the field, while providing access to three different processing systems in headquarters.

Each Seafirst office houses Honeywell branch control units that support teller and administrative terminals as well as one or two ATMs. Under its new master network plan, the bank decided to support each of these devices separately. While the branch control units and ATMs could stand alone, the bank decided to install IBM 3274 controllers to support administrative devices.

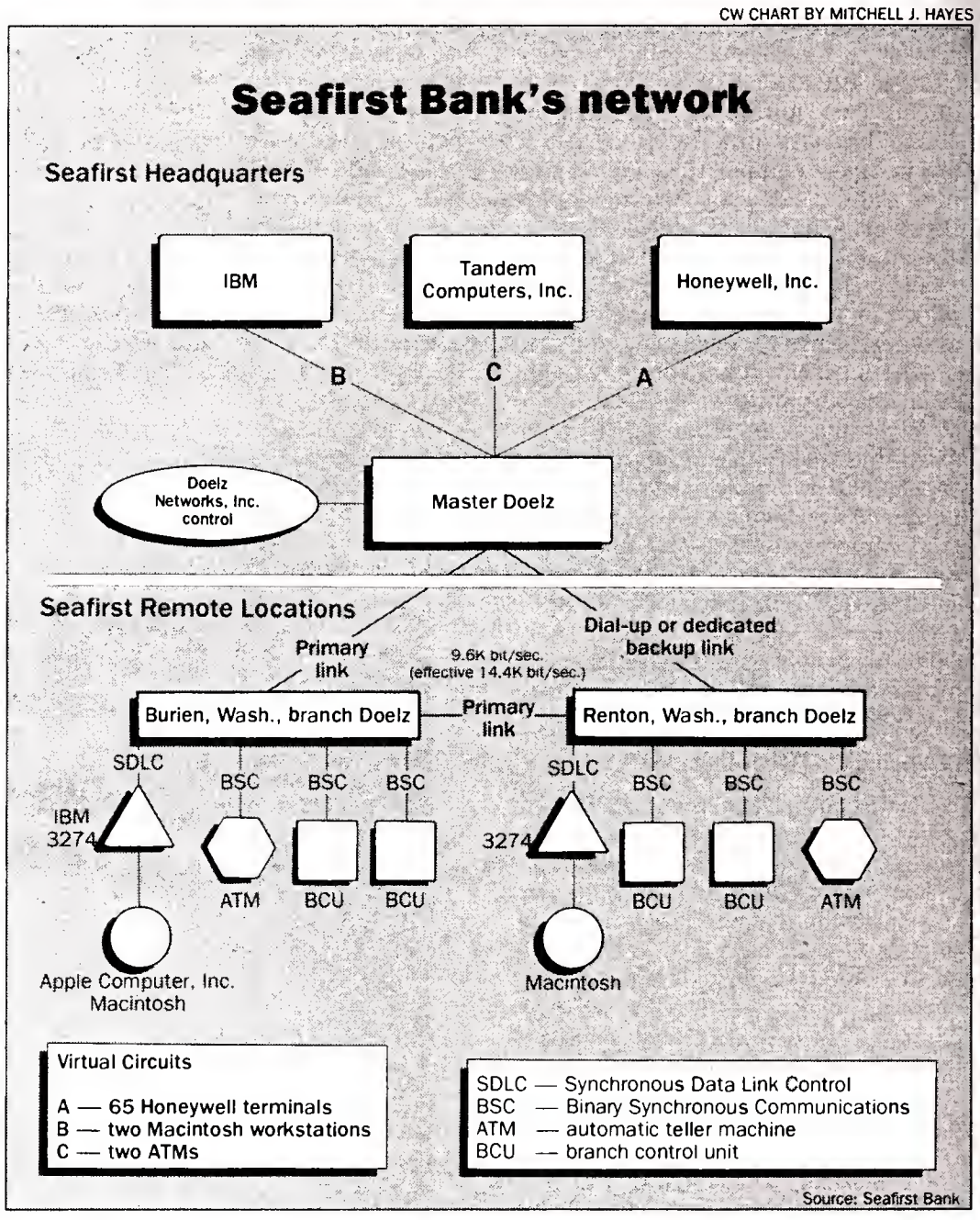
Each of these device types uses different protocols. A proprietary protocol is used between the bank's host facilities and its branch processing units; the ATMs will use IBM Binary Synchronous Communications when they are detached from the branch control units; and the 3274s will use IBM's Synchronous Data Link Control protocol.

Instead of supporting these devices on separate networks — as the protocol hodgepodge would normally require — Seafirst wanted to support all of the devices on the same multidrop communications lines.

Additionally, the bank wanted to transform some of its branch offices into network hubs. The idea is to establish 70 key branches as network points of presence and build in enough reserve capacity to accommodate new services, Turnpaugh said. This will enable the bank to bring up services from remote hubs instead of having to reengineer circuits all the way back to headquarters. The savings in implementation time alone could be 25 days or more.

Doelz's Elite One offered many of the features needed to meet all of these requirements, according to Robert J. Bowman, vice-president and manager of network services. "The Doelz box provides all the protocol transparency approaching that of a time division multiplexer, with throughput approaching that of a statistical multiplexer," Bowman said.

CW CHART BY MITCHELL J. HAYES



In initial tests, Seafirst installed a master Doelz Elite One in its headquarters and two other Doelz boxes in remote branches (see diagram). The master Elite is connected to the older Honeywell processors, the new IBM hardware and the Tandem equipment. Each branch Doelz box supports a 3274, an ATM and two branch control units.

The branches are supported on a 9.6K bit/sec. multidrop link that stops first at a branch in Burien, Wash., and then hops over to the Renton, Wash., branch. Because the Doelz equipment provides throughput similar to a statistical multiplexer, the equipment on the 9.6K bit/sec. line is run as if it were a 14.4K bit/sec. link, Turnpaugh said.

The Doelz boxes provide multiple virtual circuits over this single line, fooling attached devices into thinking each has a dedicated link. The ATMs and 3274s have their own virtual circuits. All of the branch controllers in the test share one virtual circuit as if it were a dedicated multidrop line.

An appealing feature of the Doelz equipment, according to Turnpaugh, is limited fault bypass — what the bank calls self-healing. The Renton branch in the experiment — sitting at the end of the multidrop line — has a dedicated backup link to headquarters. In the event that the main link goes down, traffic is automatically reversed and routed over the alternate facility. Eventually that capability will be provided over dedicated or dial-up lines from the last Doelz box on most multidrop lines, Turnpaugh said.

The Doelz experiment was meant to test the mainstream tasks that Seafirst's fully deployed network would be expected to handle. As such, the test supported 65 Honeywell terminals hung from four branch controllers; two Docutel/Olivetti Corp. ATMs; two IBM 3274 controllers; and two Apple Computer, Inc. Macintosh microcomputers.

The Macintoshes emulate Digital Equipment Corp. VT100 terminals through a protocol converter, which appears to the IBM 3274 like an IBM 3178 display station. The Macintoshes will be used for administrative, nonteller functions, with the 3274s providing the gateway for such things as access to corporate electronic mail and access to an IBM DB2 4.5M-byte data base.

Of the roughly 180 Doelz communications processors to be installed, about 30 have been put in place, Turnpaugh said. The senior vice-president would not divulge the value of the contract but noted that the bank would realize a six-digit savings by engineering with the Doelz equipment instead of time division multiplexers.

While the Doelz hardware is enabling Seafirst to migrate gracefully from Honeywell to IBM processors, other features are perhaps more important. The Doelz network infrastructure — providing the ability to support multiple protocols and build in reserve capacity — will enable the bank to react and provide service on a marginal cost basis, Turnpaugh said. The self-healing feature will ensure uptime.

T1 links speed net traffic

Seafirst Bank used dedicated lines to test the Doelz Networks, Inc. communications equipment it plans to use throughout its network, but eventually many branches will be supported over a high-speed backbone network that also carries voice.

The bank presently has T1 1.54M bit/sec. digital links running east to west from Seattle to Spokane, Wash.; from Seattle north to Everett, Wash.; and south to Tacoma, Wash., and Olympia, Wash., according to Timothy E. Turnpaugh, senior vice-president of operations technology division.

These circuits were justified on voice traffic alone, Turnpaugh said. Although the T1s cost as much as the leased lines previously used, the higher capacity digital links gave Seafirst 65% more reserve capacity than it had before.

While the T1 backbone figures into Seafirst's plans to support Doelz boxes at branch offices, the bank is aleady putting that spare capacity to work. When Seafirst wanted to install an IBM 3890 check sorter in Spokane, it decided to drive it out of Seattle instead of installing a remote computer.

Hardware was added to fool the sorter into thinking it was locally attached to a host processor. It is supported with a 56K bit/sec. link funneled out of the T1 carrier. "The marginal cost of the circuity was zero," Turnpaugh said.

The bank is beginning to explore how to use the reserve T1 capacity best, given its network plans. "We want to figure out how to exploit the [T1] backbone to get to branches and establish hubs," Turnpaugh said.

The effort will result in an integrated backbone for voice and data.

"Beginning next year we will review the branch voice needs and see how we can further optimize this whole thing," according to Turnpaugh.

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NEWS

AI from page 1

Addressing this concern, Symbolics, Inc., the leading supplier of AI workstations, outlined a new and widely expanded delivery strategy at IJCAI. Options will include upcoming low-cost dedicated Lisp machines; multiuser setups for existing Lisp machines via direct connection or networking; use of dedicated systems as "back-end knowledge servers" on a net; and cross-compiling Common Lisp code to run on general-purpose machines.

Like others interviewed here, Geisel suggested several other likely alternatives for future AI delivery vehicles. One is Digital Equipment Corp.'s Microvax II, which could act as a single-user development machine and then be upgraded with several terminals for running applications. Another option, he said, will be "the fabled 32-bit IBM workstation," with a reduced instruction set computer design the most promising architecture, he remarked. The next generation of personal computers also will find a role. And to round things off, Geisel predicted, dedicated AI coprocessors will be widely available within three years.

"AI is much more exciting now than it's ever been," according to keynote speaker Woody Bledsoe, AAAI president and vice-president at Microelectronics & Computer Technology Corp., and IJCAI's overall mood was as sunny as its Southern California location would suggest. But notes of caution kept cropping up.

Many tasks now suggested for AI systems will prove extremely difficult to accomplish because they deal with what Hector Levesque of the University of Toronto described as "incomplete knowledge." Such problems require the computer to deal with "all those nasty things that you have to do when you take a logic course," Levesque said. "These limits exist, and it's easy to forget [them] among all the hysteria about knowledge-based systems."

May not find widespread business use

Even when the technology is appropriate, an AI-based system may not find widespread use in business, said Beau Sheil, manager of product development at the Artificial Intelligence Systems division of Xerox Corp. "In most Fortune 500 companies, there is an advanced development group doing the strangest things," Sheil said. "But in some of them it's just not going to work."

Successful adoption of AI technology requires a corporation to have "longtime horizons, real clear ideas about what [its] needs are and a long history of successfully applying technology to those problems," Sheil said. Petroleum services firm Schlumberger Ltd., one successful user of AI technology, "has been at it for five years now, and [it's] just now shipping in bulk to field operations," he pointed out.

As in other high-technology fields, there are also signs of growing friction in the AI community between academia and industry. One sore point is the continual movement of talent into industry, which may slow down emphasis on basic research and make in-depth training much more difficult, researchers said. "There's a tremendous wave of really bright kids coming into college but not that many good AI professors," Bledsoe said.

IBM, NYU join forces

NEW YORK — IBM and New York University (NYU) have teamed up to pursue a two-year project to build a parallel processing computer, the experimental RP3.

The Research Parallel Processor Project will combine experimental 32-bit microprocessors into 64-processor units. When eight of the units are interconnected, they will become a 512-processor system with each processor linked to 2M or 4M bytes of memory, IBM spokesmen said.

An operating system devised at the Courant Institute of Mathematical Sciences at NYU has incorporated a synchronized fetch-and-add technique that bundles multiple requests for the same piece of data, retrieves it once and then broadcasts it to all requesting processors, IBM spokesmen said.

Coordination among the processors is to be handled by an interconnection network capable of moving packets of data at a maximum rate of 13 billion char./sec.

The system is being designed to address the need to work on a variety of complex problems, IBM said.

Tell us your terminal tale

The *Computerworld* October Special Report on data communications terminals will examine new terminal technologies, specifically terminals with high-resolution color graphics and integrated voice/data telecommunications.

Article contributions should take one of two forms: a tutorial article discussing an issue or an application story outlining a particular user's experience.

Deadline for contributions is Aug. 30. Articles must be typed, double-spaced and range in length from three to five pages.

Contact Janet Fiderio, Special Reports Editor, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

IJCAI sees HP, Intellicorp moves in AI programming

CW AT IJCAI

By Eric Bender
CW Staff

LOS ANGELES — The International Joint Conference on Artificial Intelligence (IJCAI), held here last week, saw a string of significant product introductions from existing AI suppliers, plus an announcement of strong commitment to AI development from one major industry player.

Hewlett-Packard Co. chose IJCAI to announce a major push into the AI programming arena.

HP's initial AI software offering, available by year's end, will be a Common Lisp development environment that runs on the HP 9000 Series 300 family of workstations announced last month. The software includes a compatible interpreter and compiler pair with an integrated debugger, Emacs editor and multiple user windows. It also provides a system interface called Browsers that is said to enable users to move freely from one part of the system to another and automatically have appropriate tools for the task at hand. Access to Fortran, Pascal and C programs also is supported.

A high-end development system based on the Model 320 workstation and running the HP-UX version 5.1 operating system will be priced in the $50,000 range. Costs for a delivery system based on the Model 310 will begin at under $20,000. More information is available from HP at 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Xerox workstations

Releasing low-cost workstations (see story page 11), Xerox Artificial Intelligence Systems also climbed on board the Common Lisp bandwagon, with plans to offer Common Lisp software in second-quarter 1986. Other suppliers that announced Common Lisp product plans include Sun Microsystems, Inc. and Franz, Inc., whose Franz Lisp product is said to be the world's most widely distributed Lisp dialect.

Among other software introductions at IJCAI, Intellicorp unveiled a PC-Host system said to enable personal computers to act as delivery vehicles for expert systems developed with the firm's Knowledge Engineering Environment (KEE) software. In the distributed system, the micro handles KEE interface functions while the host computer runs a Common Lisp version of KEE core functions, the company said.

The initial version of PC-Host supports IBM Personal Computers and compatibles and the Apple Computer, Inc. Macintosh on the desktop side and Digital Equipment Corp. VAX systems as hosts. Scheduled for delivery in January, the software costs $15,000 for the host and $495 for the personal computer.

Intellicorp also unwrapped KEE Release 3.0, scheduled for January availability, and Simkit, a $15,000 graphics-oriented simulation tool that will be delivered in October. More information is available from Intellicorp at 1975 El Camino Real W., Mountain View, Calif. 94040.

One AI-based application that grabbed the spotlight was Palladian Software, Inc.'s Financial Advisor package, which Chairman Philip Cooper described as "the first-ever commercial, large-scale expert system designed for general marketing to American corporations."

The Financial Advisor is targeted at assisting executives in planning, formulating, evaluating and monitoring capital-intensive projects and products. The package combines financial, economic, tax and accounting expertise with sophisticated mathematic techniques, Palladian said.

The Financial Adviser is designed for users without specialized financial or computer knowledge, Cooper said. During problem defini-

See IJCAI page 11

Symbolics, Xerox offer enhanced AI workstations

CW AT IJCAI

By Eric Bender
CW Staff

LOS ANGELES — Dedicated artificial intelligence workstations said to offer significant price/performance increases over their predecessors from Symbolics, Inc. and Xerox Artificial Intelligence Systems made their debuts at last week's International Joint Conference on Artificial Intelligence (IJCAI) here.

Symbolics, which claims about two-thirds of the dedicated AI machine market, enhanced its 3600 line with two systems offering performance improvements of up to 50% over their predecessors, said to Symbolics' marketing director Howard Cannon.

The new 3645 and 3675 models feature an Enhanced Performance Option, available as a $16,750 upgrade to the earlier 3640 and 3670 models.

With 4M bytes of internal memory and a 190M-byte disk drive, the 3645 costs $81,900. The 3675, with 4M bytes of memory and a 474M-byte hard disk drive, is priced at $113,000. Shipments of the machine and the upgrade are scheduled to begin in October.

Symbolics also disclosed plans to offer, within a year, low-end models, designed primarily as delivery vehicles and costing about half as much as current models. Most of the company's customers are currently developing rather than delivering AI applications, and the announcement was made to let them know that a relatively inexpensive delivery vehicle is on the way, President Russell Noftsker commented.

Along with its workstation debuts, Symbolics introduced Release 6.1 software, said to feature a technique for saving disk space, a lexically scoped debugger and other enhancements.

Additionally, the company announced a dot matrix printer with a base price of $2,995, a $9,995 laser printer, base-level support of Digital Equipment Corp.'s Decnet network standard and a slew of marketing agreements with software firms.

More information is available from Symbolics at 11 Cambridge Center, Cambridge, Mass. 02142.

Xerox Artificial Intelligence Systems rolled out two workstations that represent the lowest cost machines designed specifically to develop and run Lisp programs, according to general manager Gary Moskovitz.

He described the new Xerox 1185, which costs $9,995 with Xerox Interlisp-D runtime software, as "the first real Lisp delivery vehicle."

The 1185 comes with 1.1M bytes of internal memory and a 10M-byte hard disk drive. The Xerox 1186 development system, which can be expanded with up to 3.6M bytes of internal memory and 80M bytes of hard-disk storage, costs $15,865. Both systems are offered with an optional $750 coprocessor for IBM Personal Computer software and will be available next month.

More information is available from Xerox at Xerox Centre, 101 Continental Blvd., El Segundo, Calif. 90245.

IJCAI from page 10

tion the software reportedly checks for errors, omissions and reasonableness of data.

The Financial Advisor comes in two modules — a data base management and communications portion that runs on large IBM and Digital Equipment Corp. systems and a workstation portion that runs on Symbolics, Inc. and Texas Instruments, Inc. Lisp machines.

A system for four workstations costs $95,000. The software is set for commercial delivery in December.

Palladian Software is located at 11th Floor, Four Cambridge Center, Cambridge, Mass. 02142.

NEWS

Meet provides forum for software debuts, upgrades

CW AT INFO CENTER

By John Gallant
CW Staff

NASHVILLE — The scene was reminiscent of the old days on the computer industry conference circuit. Whether the driving force was the growing importance of information centers within many companies or the shift by marketers toward more narrowly focused trade shows, a variety of vendors used last week's Information Center Conference & Exposition here as a forum to announce products and enhancements to existing tools.

Among the software happenings, which included the debut of user training courses from at least three of the major educational products companies (see story page 13), was the introduction of an IBM mainframe-based word processing package from Group 1 Software. Group 1's EZ-Word, which operates under IBM's CICS, provides users with features such as insertion and deletion of copy, search and replace, movement of text within and between documents, full formatting capabilities and pagination.

The product can be used with list management or other programs — such as Group 1's EZ-List or EZ-Letter packages — to create letter-quality documents and form letters with variable inserts. EZ-Word enables users to share documents with other terminal users and is fully menu driven. The package is available now at a cost (perpetual lease) of $30,000 for IBM DOS environments and $40,000 for IBM OS environments. Group 1 Software is located at 5185 MacArthur Blvd., Washington, D.C. 20016.

Information Builders, Inc., whose Focus fourth-generation language is a mainstay in many information centers, gave users of that product an interface to IBM's DB2 relational data base management system.

The interface will allow Focus users under IBM's MVS/TSO to access DB2 tables. Users can execute Focus' reporting and data analysis functions, such as report writing, ad hoc queries, statistics and financial modeling, against DB2 data bases. The interface also allows users to join up to 16 different DB2 tables relationally as well as join the DB2 tables with other files, including Focus and IBM's Vsam, Qsam and IMS. Data from DB2 files can be downloaded to IBM Personal Computers with Information Builders' Foctalk link. The Focus/DB2 interface is scheduled for October availability. It will be priced at $8,500. Information Builders is located at 1250 Broadway, New York, N.Y. 10001.

Comshare, Inc., producer of the System W decision support system, also unveiled an interface to one of IBM's major products. The company introduced an interface — dubbed W/SQL Pipeline — between System W and IBM's SQL/DS data management system.

W/SQL Pipeline reportedly provides a data view from System W to SQL/DS data bases allowing either read-only virtual access or extraction of data from SQL/DS into System W. The interface features use of SQL/DS's security, concurrency and data dictionary capabilities and full screen facilities for viewing SQL/DS data using W/Datman, System W's relational data management facility. W/SQL Pipeline runs on IBM mainframes with SQL/DS Release 2 or 3 and a minimum System W configuration with W/Datman. The interface is available now for $7,500. Comshare is located at 3001 S. State St., Ann Arbor, Mich. 48106.

Gateway PC link

SCA Products & Services, Inc. chose the gala here to release an enhanced version of its Gateway PC micro-mainframe link. According to a spokeswoman, Gateway PC supports data transfer between additional mainframe and micro packages, including IBM's TSO and Lotus Development Corp.'s Symphony.

Gateway PC uses menus and screens to give users access to applications and data on the micro and mainframe. The link automatically builds 1-2-3 and Symphony spreadsheets from mainframe data and formulas. It runs on the IBM Personal Computer, XT and AT and includes a mainframe module that operates under IBM's CMS or TSO. The enhanced version is available now at a cost between $200 and $350 per micro and $18,000 for the mainframe module. SCA Products & Services is located at 353 Lexington Ave., New York, N.Y. 10016.

Chicago-Soft, Ltd. announced its 301 system, which consists of three products for micro-mainframe connection. ARX-Link allows IBM Personal Computer users to access mainframe data files selectively with automatic reformatting for micro packages. The second 301 component, ARX, provides for selective and incremental backup and restore of micro data files on a mainframe using a master IBM Vsam file. The package can run in unattended mode so backup can be done in off-peak periods. Control-PC, the final module, allows users to build a central repository of

See DEBUTS page 13

Announcements spotlight concern for user training

CW AT INFO CENTER

By John Gallant
CW Staff

NASHVILLE — Reflecting the increasing role of information center personnel in user training, at least three major vendors chose last week's Information Center Conference & Exposition as a springboard to launch educational products.

Advanced Systems, Inc. introduced four training courses employing a variety of instructional techniques. A microcomputer diskette- and videotape-based course called "Learning to Apply Symphony" helps users learn five basic functions, including spreadsheet and word processing, of Lotus Development Corp.'s Symphony integrated software. The course includes two videotapes, a data diskette and viewer's guide.

An eight-unit video course titled "IDMS Goldengate: Cullinet's PC Software" teaches users to master the information manager, edit, spreadsheet, graphics, profile and emulator tools of Cullinet Software, Inc.'s Goldengate micro software. Advanced System's "CMS (Xedit)" six-unit computer-based training (CBT) course offers instruction in IBM's CMS and Xedit mainframe software products.

Each of the training courses can be rented for $50 per month per module.

Advanced System's "Personal Consultant" interactive videodisk instruction course, which can be rented for $90 per month per module, is designed to teach novices to use microcomputers. Advanced Systems is located at 155 E. Algonquin Road, Arlington Heights, Ill. 60005.

Course hones writing skills

The Phoenix Courseware Group of Goal Systems International, Inc. unleashed two CBT tools at the conference. "Effective English for Business Writing" is a CBT course designed to help users hone their writing skills. It is priced at $4,900 for a permanent license fee.

"Ease/Instructor" is said to help instructors and training managers plan and administer CBT courses. "Ease/Instructor" costs $3,200 for a permanent license. Phoenix Courseware Group is located at 5455 N. High St., Columbus, Ohio 43214.

Deltak, Inc. offered four new training courses, including the following:

■ "Symphony," a two-course video series with training exercises for users of Lotus' Symphony. The package costs approximately $125 a month.

■ "Analyzing Sales Performance Using the Lotus 1-2-3 Program," a micro-based CBT course aimed at sales professionals and management. The course costs $70 per diskette.

■ "Talk English to Computer with Intellect," a one-hour video course for users of Artificial Intelligence Corp.'s Intellect. The course carries a rental charge of approximately $125 a month.

■ "Working Effectively with the Information Systems Department," a five-course video series for end users and MIS managers. The rental charge for the course is approximately $125 a month.

More information is available from Deltak, East-West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

DEBUTS from page 12

micro software stored on the mainframe, allowing access to the packages only to authorized users. The package tracks software use by user.

ARX-Link uses IBM's CICS and supports most IBM 3278 emulator boards, 3274 emulators and protocol convertors. Base pricing begins at $12,500 for DOS/VSE and at $30,000 for MVS.

Chicago-Soft is located at Suite 2, 738 N. LaSalle, Chicago, Ill. 60610.

Compatibility, integration key to info center tool choice

CW AT INFO CENTER

By John Gallant
CW Staff

NASHVILLE — What are the most important factors to consider in selecting software for an information center?

If you said price, functionality or vendor reputation, you are off the mark. But if compatibility and ease of integration with other software products topped your list, you are correct — at least according to the panel of top information center professionals who spoke at a forum on software selection at last week's Information Center Conference & Exposition here.

All the panelists, whose information centers support end-user populations ranging from approximately 200 to nearly 1,000, agreed that a product's ability to fit into an existing information architecture and to share data with other packages are the most important factors in their software selection decisions.

"We are not overly concerned with price," said Kenneth Barton, information center manager for the Vancouver, B.C.-based airline CP Air. "We have a big investment in hardware, and software is a relatively small component of the overall cost of workstations. Connectability and integration are the key issues."

Primary concern is integration

Kenneth Baker, manager of end-user computing and office automation for Lexington, Ky.-based Ashland Oil, Inc., echoed Barton's point. "Price is way down the list. Our primary concern is the integration of all the products we support. We have to have the ability to interchange data," Baker said.

Doug McGregor, senior information center specialist with London Life Insurance Co., London, Ont., said, "What we ask is 'How does this product relate to the rest of our product line? Can we move data around with it?' We don't have any more stand-alone personal computers. Integration, data transfer and compatibility are the vital issues involved here."

As a result, McGregor said, he would relish the opportunity to start from scratch.

"We would love to have a clean slate. We are using old, tired products that overlap functionally," he said. "If we could start over again, we would take a hard look at organizing our product line. I recommend that people just starting information centers think carefully about the products they want to have in place two years from now, especially considering the data communications aspects."

Barton said the quality of vendor-supplied documentation and other training materials has taken on a new importance. "As our users get more geographically diverse, documentation is becoming a more important factor in the selection process. As it becomes more difficult to support individual users, the training materials take on a new significance," Barton said.

Where the information center professionals differed was on how they select the standard products they offer to their end users.

McGregor said that while his technical staff stays up-to-date on new products, the evaluation and selection process is primarily user driven. "The users ask us for certain capabilities and products, and we do the research," he said.

That approach contrasted with CP Air's information center, which, Barton said, takes a leading role in seeking out new products.

"Everyone's information center is different," Barton said. "We are proactive. We try to lead our users to products that we think will boost their productivity. In a sense, we are dragging users to certain products."

NEWS

M&D from page 1

viewed at last week's conference were positive about the Millennium enhancements. Citing prior complaints that Millennium 1 has a seemingly voracious appetite for machine resources, the users were especially happy with promised improvements.

In opening remarks at the conference, attended by about 1,700 users, M&D President Frank H. Dodge called AR:M "the best product M&D has ever produced."

Mickey Clark, AR:M marketing manager, said eight people worked two years to develop the product. Many of the Millennium upgrades resulted from the AR:M development effort, he said.

To market in 1983

Millennium was brought to the market in 1983 as M&D's integrated system for developing on-line applications. Data input and query interfaces are consistent across Millennium applications. An M&D spokesman said 1,870 Millennium packages for on-line development have been shipped.

Enhancements in Millennium 2 include an interactive screen design feature that allows interactive building and modifying of screens, a spokesman said.

With the Quick Commands feature, users can now devise simple commands for use with any Millennium application. A Help Redirection feature lets users display actual values along with text.

A Data Macros feature allows calculations to be performed on specific fields for greater flexibility in executing queries and using M&D's Interactive PC Link micro-mainframe package.

The AR:M package will initially be available for IBM MVS and DOS operating systems and IBM's IMS data base management system.

AR:M requires Millennium 2 and will cost approximately $100,000, a spokesman said. An international version of the package will be available at a later date.

Dodge said the company is now working on Millennium 3, which, he said, "will be more integrated with data base management systems than prior versions." Robert D. Kelley, M&D's vice-president of product strategy, said Version 3 will be more relational in nature and will be compatible with IBM's DB2 and SQL.

In what a company spokesman said was an important feature for users with investments in their own or packaged non-M&D software, Millennium 2 offers an optional Batch Transaction Processor (BTP), said to translate automatically non-Millennium transaction records into Millennium-understood files.

For example, BTP could be used to reformat a company's in-house or non-M&D billing system into a format accessible by AR:M, Kelley said. The BTP option will cost $15,000.

William Fitzpatrick, M&D's new product development manager, said that with Millennium 2, "We've found things to make [Millennium 1] more convenient to work with. We've also speeded the system up," by recoding some Cobol into assembly language.

At the same time, M&D replaced IBM's macro-level CICS supported in Version 1 with the less-efficient command-level CICS in Version 2, because IBM announced it was discontinuing support for the macro level, Fitzpatrick said.

Broke even

"What we gained in efficiencies we lost in going to command level, so we broke even," he said.

Kelley maintained performance did improve, with estimates that command-level CICS lessened performance 20%, while the recoding improved performance by 30% for a 10% net gain.

The Millennium enhancements will be well received by DP departments, users predicted. Bruce Pergament, vice-president of administration at the Melville, N.Y.-based Pergament Home Centers stores, said Millennium "does take up a lot of space on the mainframe. I know M&D has been deeply concerned about that."

Jerry Smith, senior systems analyst with the Albuquerque Federal Savings and Loan in Albuquerque, N.M., said, "I hear the DP people say that Millennium hogs the machine." But he said the DP people may not appreciate what the software is doing.

Millennium 2 is initially available for IBM CICS and Vsam environments. Version 1 will be supported for another 12 to 18 months, a spokesman said.

REPORTER'S NOTEBOOK

CW AT WORLD '85

Ramblings from the floor of World '85:

■ McCormack & Dodge Corp. used advanced presentation technology at its World '85 users conference in Boston last week. Most session leaders were linked directly to the company's mainframes in Natick, Mass.

In a preview of the company's AR:Millennium accounts receivable package, AR:Millennium marketing manager Mickey Clark tapped into a live version of the product to demonstrate how a credit representative would use it. The Personal Computer screens were projected in color onto larger screens. Graphics created with IBM's Storyboard micro software complemented the micro screens. A few session leaders resorted to the trusty overhead projector to convey the latest in software.

■ M&D President Frank Dodge said that the company has spent $2.3 million on equipment in the computer room of its Natick headquarters this year. Among installed products is IBM's DB2. M&D also spent $800,000 to enlarge the computer room. Dodge said his firm, a Dun & Bradstreet Corp. subsidiary, would top the $100 million mark in revenue this year.

■ Robert D. Kelley, M&D vice-president of product strategy, said the company is very interested in developing artificial intelligence applications. "But the AI we provide will be on the mainframe in the Millennium environment," he specified. Kelley said M&D will not program any expert systems in Prolog or Lisp. M&D has considered acquiring an AI software firm but so far has rejected all possibilities, Kelley said.

■ In describing the company's efforts to develop a more rigid systems development life cycle, Kelley said, "We are trying to better manage slippage of availability dates. Whether it will be faster we don't know, but at least we'll be able to predict better."

Development meet set

TOPEKA, Kan. — The 10th annual Data Structured Systems Development Users Conference, Feedback '85, will be held at the Holiday Inn West Holidome here Oct. 8-10.

Speakers for the conference will address object-oriented design and the Ada language, the application of structured requirements definition to knowledge engineering problems and pragmatic successes in data and systems architectural development.

Other topics to be addressed are computer-aided software engineering, using Pacific Bell's system to build data systems, the human aspects of technological society and the characteristics of a framework for information systems architecture.

Prize for info science excellence

Jean-Dominique Warnier will present the third annual Warnier Prize for excellence in the field of information science.

The registration fee is $500 before Sept. 6 and $550 after that date.

More information on Feedback '85 can be obtained from Ken Orr & Associates, Inc. at 1725 Gage Blvd., Topeka, Kan. 66604.

Cbema raps warranty legislation

WASHINGTON, D.C. — The head of the Computer and Business Equipment Manufacturers Association (Cbema) recently lashed out against computer warranty legislation pending in California, Pennsylvania and New York, arguing that it would raise prices.

Vico E. Henriques, Cbema's president, said in a statement that the bills are "unnecessary, heavy-handed and shortsighted."

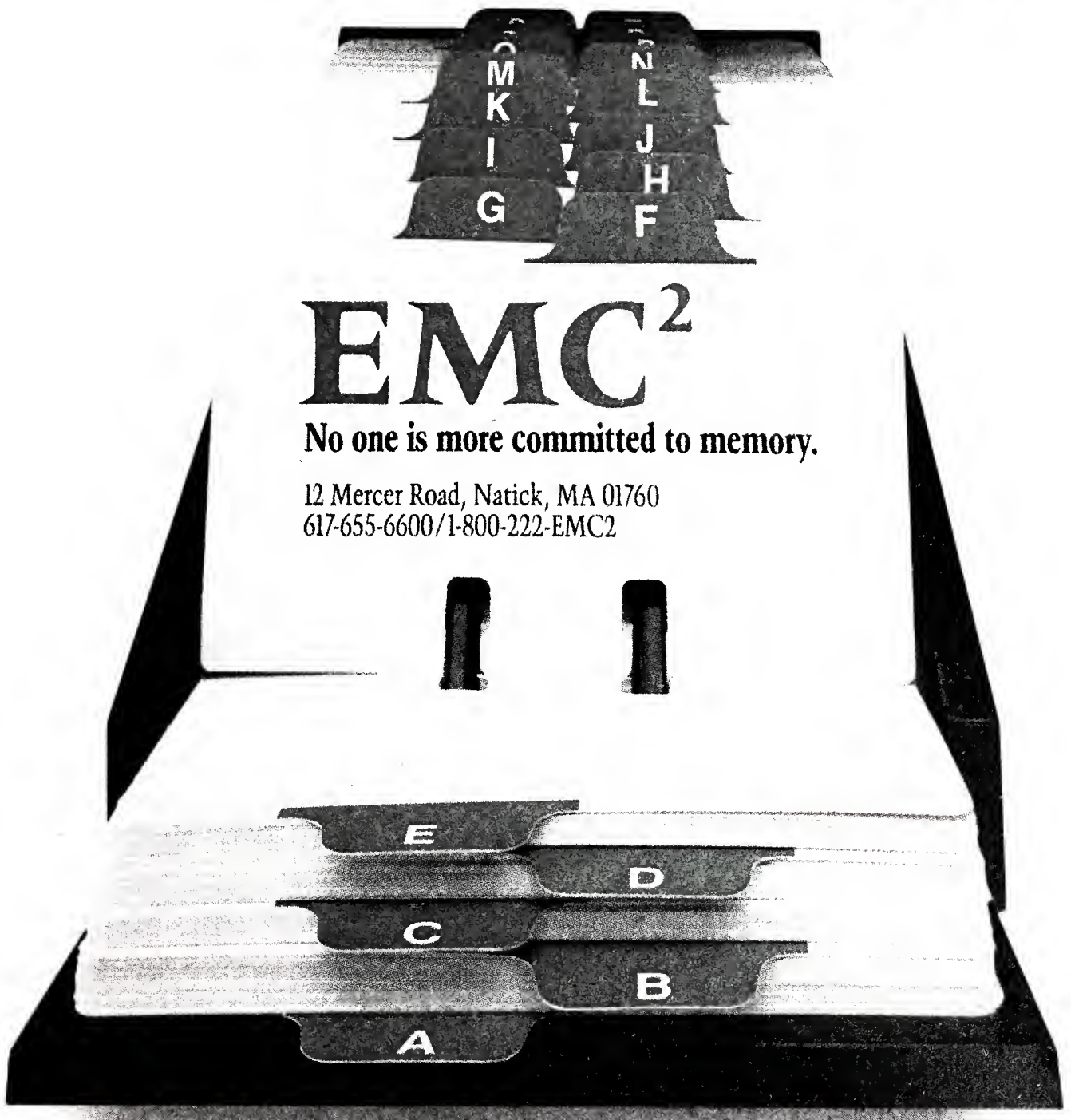
In general, the bills seek to protect computer buyers from purchasing poor or unsuitable hardware and software. For example, the California bill (A.B. 1507) would require vendors to furnish an implied warranty of fitness for a specified application [CW, July 29].

"Someone who needs a computer for only a year, or someone who wants simply to experiment with the product, could use it free for a year and then claim a vague implied warranty and return it," Henriques said.

Henriques took specific exception to the bills' demands for one-year warranties, which he said would add the cost of a one-year service contract to each computer sold. He called that "an attack on the consumer's right to accept or reject a service contract."

The Cbema chief further argued that computer buyers already have protection, including the Universal Commercial Code, small claims court, the Federal Trade Commission, state consumer-protection officials and the Better Business Bureau.

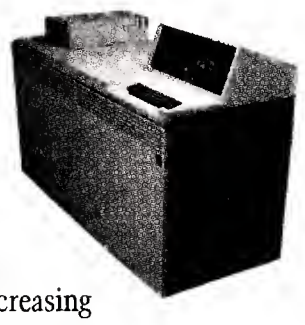
Why the three letters you think of first for System/38 add-in memory shouldn't be IBM.™



EMC introduces its 1MB memory expansion card for the System/38.

EMC has just added a feature to add-in memory for IBM's System/38 that's been sorely lacking.

Competition.



Like IBM's 1 Megabyte add-in memory, our new memory expansion card lets you boost the speed and performance of your System/38. Without increasing software or other hardware costs.

But unlike IBM, we let you do it for $2,000 less. (IBM's price is $7,500, ours is just $5,500.)

And our new 1 Megabyte memory uses newer, more reliable technology. It's *so* reliable, there are *no maintenance charges* of any kind.

IBM, on the other hand, charges you a memory maintenance fee of more than $1,000 a year. Every year.

Our memory comes with the industry's only unconditional warranty.

EMC is the first company to ever offer you an *unconditional lifetime warranty* on a System/38 memory card. And we offer the same warranty on every other memory card we make.

If you even *suspect* a problem, just call our special toll-free hotline and we'll send you a new card *within 24 hours*—absolutely free.

And our new memory expansion card is *100% plug compatible* with the System/38. So it supports all IBM memory and memory diagnostic features. Installation takes just 10 to 15 minutes (you can even do it yourself) and does not affect your IBM maintenance coverage in any way.

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CW-1

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NEWS

WORLD DIGEST

CW International News Network

CANBERRA, Australia — An angry row has broken out over allegations that corruption involving an Australian Customs Service computer is allowing criminals to enter and leave Australia undetected. The charges have been made by the Australian Federal Police Association, which has demanded an immediate government inquiry into information that downtime on the Customs Service computer coincided with the arrival and departure of some 60 criminal suspects during the last 12 weeks. The Federal Police, however, deny there is any such problem, while publicly admitting that the system sometimes suffers from the "hiccups."

MELBOURNE, Australia — The First Pan Pacific Computer Conference will be held here Sept. 10-13. Show sponsors at the Australian Computer Society and the International Federation of Information Processing expect more than 150 vendors at the conference, whose theme is "Software — The Driver." Some 126 technical sessions will be offered.

STOCKHOLM — The president of one of Sweden's largest software houses has called for government aid in developing and distributing software. "The Swedish state should help with the development costs through subsidization," said Magnus Larsson, president of a software company called Expander.

STOCKHOLM — The Swedish committee on copyright protection is preparing a report that is expected to advocate extending copyright coverage to computer software and semiconductors. The government will make the final decision concerning adoption of the committee's recommendations.

SINGAPORE — A joint venture set up here by Burroughs Corp. and Detroit-based Yojna, Inc. will be the first software company here to be granted a five-year tax holiday under a government incentive plan called Intec, established by the country's National Computer Board. The company, called Burroughs Cyberware Ltd., will conduct applied research and development into two existing product families — Global and Local-Area Communications Executive and Prototyping Environment Utility System — which Yojna has been developing for some years in Detroit.

MUNICH — The German Postal Telegraph and Telephone (PTT) authority has approved a test run of a voice/mail system, scheduled for April 1986. The voice/mail system would enable transmission of time-delayed messages from computer workstations. Three companies won contracts for the equipment involved in the project: Siemens AG, Standard Elektrik Lorenz AG and German Telephone Works and Cable Industry AG.

CANBERRA, Australia — The federal department responsible for providing policy advice on uranium-related and nuclear issues has publicly admitted that its computer system is vulnerable to sabotage by antinuclear extremists and that it has no formal backup plan. A strategic plan published by the Resource and Energy Department said that complete loss of this system due to sabotage is possible.

The department relies for emergency backup on Prime Computer, Inc., its computer supplier, and other government departments. Furthermore, the department felt that having two identical versions of its Prime minicomputer — both on the same site — served as partial backup.

COLOGNE, West Germany — Profits jumped 42% for fiscal year 1984 at Honeywell Bull AG. The German subsidiary of the French Groupe Bull earned $7.2 million, up from $5 million in 1983. The company predicted continued growth for 1985. Revenue for 1984 increased 10% to $138 million. Large systems accounted for an additional 29% of this revenue, while minicomputers, workstations and terminals amounted to 20%.

SYDNEY, Australia — Wicat Systems of Australia is claiming some of the credit for Wicat Systems, Inc.'s return to profitability during the June quarter. The U.S. parent company reached $110,000 in profits on $9.7 million revenue in that quarter, the first time it has made a profit since becoming a public organization two years ago. A spokeswoman here explained that the Pick operating system, ported to Wicat hardware by the Australian company in 1983, had been selling well since its U.S. release in March.

MUNICH — In a race to grab future customers, Siemens AG and AT&T have been crisscrossing the Atlantic recently to expand their businesses on each other's home turf. Siemens has created facilities in Boca Raton, Fla., while AT&T has launched Microelectronics GmbH here in Munich with a former Siemens executive at the helm. Seimens already has some 15,000 people at work in Boca Raton's Seimens Communications Co. Both companies are expected to concentrate on the telecommunications and office automation markets.

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TURNAROUND TIME

Larry Long

***Q** I am responding to a letter in your column in which a disgruntled person was complaining about the treatment received from a headhunter. The complaint arose from the agent's lack of respect for the candidate's wish that the agent not contact a certain firm.*

It is unforgivable for any agent to disregard the wishes of the candidate he represents. A candidate should never work with an agent who will not respect a legitimate request. Tell the agent what you expect, and send the agent the demand in writing. If the agent does not acquiesce to this demand, turn him in to the governing state agency.

In the many years we have been placing computer professionals, we have never sent a resume until we first get in touch with our candidate and determine that we have a mutual agreement that the position is suitable. Technically, the resume belongs to the candidate, and we treat it as such.

Please inform your readers to demand that their agents inform them prior to sending any resumes and that they work as a team. If an agent will not agree to these terms, dump him.

It is unforgivable for many professionals — lawyers, computer specialists and a host of others — to do what they do, but they do it anyway. They will continue to do it as long as we let them get away with it.

I invite any readers who feel they have been treated in an unethical manner by a search firm to let it be known. Let's see what can be done to eradicate the unethical elements in this business.

***Q** I am a [U.S.] citizen, reside in Europe and work at the computer technician level for a U.S. multinational company on an expatriate basis. I have made a decision to leave my company but wish to remain in Europe. Could you advise me how to find other U.S. companies and interest them in offering me a job on expatriate terms?*

I wish I could be more encouraging, but you may have better luck if you seek employment with a European firm.

Virtually all multinational companies operating in developed countries prefer hiring foreign nationals at the operational levels.

Most European assignments are awarded to middle and upper management personnel whose future positions in the U.S. will require some international exposure.

Your best bet may be to conduct your search in Europe, just as you would conduct a similar search if you were in the U.S.

***Q** My husband is currently a systems manager at our company's headquarters. I work as an administrative assistant in the personnel department. My husband was recently offered a promotion, with a 50% increase in salary, but we would have to move to a regional office in the Midwest.*

Under normal circumstances, the company would be willing to transfer me as well, but since my husband will have authority over all departments that would hire secretaries and administrative people, they said that I would not be able to transfer to that office.

My husband wants to go, but I'm having second thoughts. If they can transfer other husband and wife teams, why not us?

Most companies will not permit a situation where one spouse can in any way influence the performance evaluation of the other. It may be a while before opportunity knocks a second time for your husband. If he turns down this position because you will not be retained, company executives will consider his decision to be poor judgment and will be reluctant to offer such a promotion in the future.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, *P.O. Box 880, Framingham, Mass. 01701.*

NEWS

CALENDAR

WEEK OF SEPT. 22

SEPTEMBER 22-26, BOULDER, COLO. — **Intelligent Building and Information Systems.** Contact: Tom Cross, Cross Information Co., Suite C, 934 Pearl, Boulder, Colo. 80302.

SEPTEMBER 23-24, CAMBRIDGE, MASS. — **Decision Support and Expert Systems: A Developer's Perspective.** Contact: Decision Support Technology, 51 Church St., Boston, Mass. 02116.

SEPTEMBER 23-24, NEW YORK — **TP and Network Fundamentals.** Contact: Sys-Ed, Computer Education Techniques, Inc., 35 W. 35th St., New York, N.Y. 10001.

SEPTEMBER 23-24, SAN FRANCISCO — **Financial Futures, Options and Swaps.** Contact: Alice Gibons, Inter-Financial Association, 21 Tamal Vista Blvd., Corte Madera, Calif. 94925. Also being held Sept. 30 to Oct. 1 in Chicago.

SEPTEMBER 23-27, HARTFORD, CONN. — **Advanced Systems Analysis.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

SEPTEMBER 23-27, KANSAS CITY, MO. — **Basic Systems Analysis.** Contact: Thomas J. Bisacquino, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held Oct. 7-11 in Los Angeles.

SEPTEMBER 23-27, SAN FRANCISCO — **Project Management Control Workshop.** Contact: Elise Rabalais, Learmonth & Burchett Management Systems, Inc., Suite 405, 2800 N. Loop W., Houston, Texas 77092.

SEPTEMBER 26-27, ATLANTA — **Information Centers: End-User Computing.** Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

SEPTEMBER 26-29, BOSTON — **The Eighth Northeast Computer Faire.** Contact: Computer Faire, Inc., 181 Wells Ave., Newton, Mass. 02159.

WEEK OF SEPT. 29

SEPTEMBER 29-OCTOBER 2, CHICAGO — **American Bankers Association (ABA) National Bank Card Conference.** Contact: ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

SEPTEMBER 30-OCTOBER 1, NEW YORK — **Sixth Annual Computer Law Institute.** Contact: Law & Business, Inc., Harcourt Brace Jovanovich, Inc., 855 Valley Road, Clifton, N.J. 07013.

SEPTEMBER 30-OCTOBER 2, BOSTON — **Index '85.** Contact: Independent Expositions, Inc., 786 Rockrimmon Road, Stamford, Conn. 06903.

SEPTEMBER 30-OCTOBER 2, BOSTON — **Information Systems Architecture.** Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

SEPTEMBER 30-OCTOBER 2, NEW YORK — **Comlease — The Computer Leasing Conference and Exposition.** Contact: Comlease, 3825-1 S. George Mason Drive, Falls Church, Va. 22041.

SEPTEMBER 30-OCTOBER 3, WASHINGTON, D.C. — **The Fifth Annual Conference on Control, Audit and Security of IBM Systems.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

SEPTEMBER 30-OCTOBER 3, WASHINGTON, D.C. — **Using Microcomputers in Government.** Contact: U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903.

SEPTEMBER 30-OCTOBER 4, HOUSTON — **Structured Analysis & Design Workshop.** Contact: Elise Rabalais, Learmonth & Burchett Management Systems, Inc., Suite 405, 2800 North Loop West, Houston, Texas 77092.

SEPTEMBER 30-OCTOBER 4, WASHINGTON, D.C. — **Computer Capacity Planning.** Contact: Compumetrics Training Institute, P.O. Box 58383, Houston, Texas 77258.

OCTOBER 3-4, ST. LOUIS — **Federal ADP and Telecommunications Procurement.** Contact: International Data Corp., Washington Division, Suite 240, 1500 Planning Research Drive, McLean, Va. 22102. Also being held Oct. 17-18 in Denver.

EDITORIAL

Hands off

The legislative busybodies are poking around computers again. Having raised alarms at such prospects as renegade hackers tapping sensitive data bases and foreign snoops using directional antennae to snatch unprotected data from terminal screens, the when-in-doubt-legislate boys are turning their attention to electronic bulletin boards. Their activities deserve keen attention and must be headed off lest the free flow of electronic information winds up outside the purview of basic First Amendment protection.

Bulletin boards are one of the most unique and fascinating phenomena of the microcomputer revolution, frequently providing useful new technical and application data to serious computer users. Alas, they are also used for considerably less noble purposes. Some broadcast obscene messages, others list purloined computer passwords and network access codes. Indeed, computer security experts estimate that there are at least 1,000 underground bulletin boards that traffic exclusively in illegal topics.

People *do* abuse freedoms. Always have, always will. They do it in newspapers, they do it on highways. Typically, those people are in the distinct minority and are best ignored unless and until they do serious injury to others.

Electronic bulletin boards, however, are not being ignored. *Computerworld's* Washington, D.C., bureau has recently looked into this story and uncovered some unsettling developments.

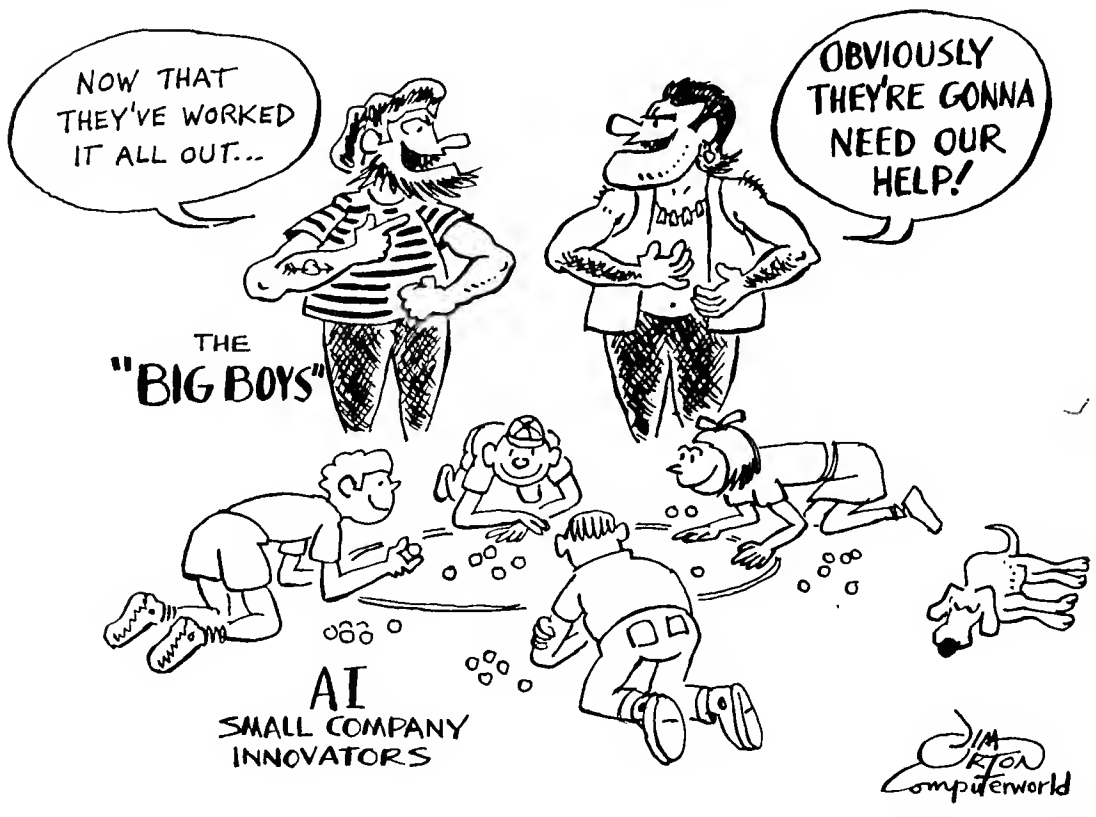
At the federal level, Sen. Paul S. Trible Jr. (R.-Va.) recently introduced a bill (S. 1305) banning pornographic messages from computer bulletin boards. In particular, Trible wants to close down "sex talk" computer services and networks run by alleged child molesters who share information about their victims.

At the state level, California is leading the way. A bill introduced by Sen. John Doolittle (R-Calif.) would make it illegal for anyone to place a password, access code or financial account number on a computer bulletin board without authorization. It would also make the system operator liable for permitting the information to remain on the bulletin board after being notified that it was unauthorized.

These represent misguided attempts to harness change by putting it into a legislative straitjacket. Electronic bulletin boards — like newspapers and books — should have First Amendment protection. They are a legitimate medium for transmitting essential information that should have First Amendment protection. Efforts to regulate this form of electronic publishing could have a chilling effect on free speech, especially in its effect of prompting operators to censor their bulletin board offerings out of fear of legal prosecution.

A far better overall approach is the one taken by the computer crime committee of the Data Processing Management Association (DPMA) in its model computer crime bill. This proposal urges aggressive pursuit of those who use bulletin boards to engage in illegal activities and proposes to outlaw "aiding, abetting, conspiracy and/or solicitation of a computer crime," such as by posting a computer password or network access code on an electronic bulletin board.

The DPMA approach seems, by far, the most reasonable solution to an admittedly awkward problem. The label of illegality must never be applied to information in a free society. That is too easy and too dangerous a step to take, even when confronted with the threat of personal computers, modems and telephones in the hands of miscreants.



LETTERS

Users responsible for Unix survival

In the article, "AT&T's Unix: the formula for revolution?" [CW, July 8], few people view Unix as a replacement for MVS or anything else. Rarely do information systems replace something else. They migrate or coexist, depending on the type of processing.

Second, the statement in the article saying that manufacturers' "hardware would become a commodity" is one of the major reasons why Unix will survive. The other reason is also commodity-driven: well over half of today's computer science graduates are trained in C and wouldn't dream of working in traditional programming languages.

The Unix market is no different than any other save for two critical factors — users do not have to be manufacturer-dependent, and the already low supply of computer science graduates who are Unix-trained.

For once, the users may be in the driver's seat.

Paula J. Brooks
McLean, Va.

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VIEWPOINT

The future of mid-range systems

LECHT ON SCIENCE
Charles P. Lecht

In my last column, I suggested that there are still opportunities for small systems, especially if planners focus on creating easy-to-use, special-purpose tools rather than on general-purpose systems needing laborious applications programming. At a time when sales are sagging and manufacturers are failing, this may have seemed the witless remark of an unbridled optimist.

My latest prognostication may be every bit as hard to accept: Despite recent reports of dwindling profits in companies that manufacture mid-range systems, I forecast that this will change because of reasons similar to those I cited when discussing the small systems picture.

I never denied that small systems as we have conceived of them must face diminishing sales. I based my optimism on the fact that the technology influencing small systems product offerings is undergoing rapid change; the result is a new class of products that do less but do it with less fuss. I concluded that because of this, more people than ever before would purchase the powers such small systems provide.

So what about the future of mid-range systems? First, my definitions: A small system is one that can't do too much, or if it can, it can't do it too fast. A mid-range system — sometimes called a medium system — is one whose processing powers exceed those of small systems and are less than those that can be obtained in others of the same genre.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

Until recently, medium systems technology was consigned, for the most part, to the role of providing bigger versions of small general-purpose computer systems — but not the biggest that could be had. In the good old days, the 1950s and '60s, no one could have misunderstood what bigger meant. Then, small, medium and large systems were defined by size considerations of a highly conventional nature.

In these times, defining a system as big or small is risky business; all kinds of conditional complexities have entered the picture. Nonetheless, if you accept the idea that mid-range systems exist, whatever criteria you use to identify them, I can argue that these offer the greatest potential in the data processing systems area.

Mid-range systems will see a vast improvement in sales when very basic premises that influenced past design are removed. Thus I suggest that designers who overcome their compulsion to view these as nothing more than bigger versions of small systems will likewise see vast improvements in the sale of their products. The reason: two recent events that have forever changed our DP world.

The first, distributed systems technology, was born within the computer industry as systems designers realized that the miles of cabling inside their computer inventions could be uncoiled. When the cabling was uncoiled, it allowed a system to be distributed over increasing areas and ultimately to be linked to other systems by preexisting, in-place networks of communications companies.

The second was the inevitable synthesis of the computer and communications industries as the latter continually increased the intelligence — a euphemism for computer technology — in their networks. Both events created the impetus for Integrated Services Digital Networks (ISDN) — small to large and everything in between.

From here on, the ISDN are the new family of general-purpose computer systems. The heretofore discrete but general-purpose systems technologies — desktop, small, mini, midi (mid-range), maxi and super will become ever more specialized. And it's my guess that the mid-range will, by dollar volume, exceed all others in its command of our collective data processing hardware expenditures.

Within the framework of the ISDN, these systems will play the vital role of mediation once found within the cabinet of a single CPU but now distributed all over the place. This includes the roles of net and device controllers, file servers, data base machines, concentrators, nodal processors, convertors, switching subsystems and so on.

By tending to flocks of terminal devices while servicing the needs of massive supercomputers as I/O data staging devices, the mid-range computer is destined to be the workhorse of the ISDN, whatever its size.

The new role of these systems is in some ways confounding to people inside and outside the computer industry. Having been bombarded with notices of astonishing change in small and large systems technologies, many seem to have concluded that there is no role for the mid-range in the scheme of things; therefore, it is on its way to becoming extinct.

Some seem to have adopted the belief that only bipolar data processing environments — massive machines servicing very small terminals — are in our future. I vigorously dispute this; there is no precedent for the bipolar theory. Even in telephone systems technology, local exchanges, or mid-range in this context, far exceeded in number the larger systems to which they were attached and, in dollar value, these and the sea of telephones that they served.

The role of mid-range systems technology is brighter than ever. We'll not be able to scale the ladder of data processing possibilities, bottom to top, with its middle rungs missing.

Microcomputer support: headache or gold mine?

MANAGEMENT MATRIX
Walter F. Cuirle

Microcomputers have been around for only about eight years as a consumer item. As an affliction in the day-to-day life of the MIS manager, they have an even shorter tenure — about five years. A great deal has happened in that time: vendors and services that seem to have been around forever but haven't, companies that seemed as if they would last forever and didn't.

MIS managers reacted in a variety of ways while all of this was going on. A few pulled the wagons in a circle and tried to fight off the onslaught. They were buried with their punch cards. Others disdained the new toys, retreated to their raised-floor temples and held fast to the attitude of the good old days when the data processing world was divided into the Initiates and the Rabble. The Rabble went on without them.

Nowadays, what seems to have evolved in most companies is an understanding that corporate MIS will handle corporate affairs and leave the various departments or divisions to make their own individual decisions on whether to implement microcomputers and how to do it. It's as if the MIS motto has become, "If it doesn't talk to the mainframe, don't talk to us."

Cuirle is a senior associate with Nicholas DeMaio Associates in Bryn Mawr, Pa.

That's a shame. The whole industry still has the fervor of a gold rush. And in a gold rush, it is not the miners who make the fortunes but the folks who sell support.

Take a look at the vendors of the popular microcomputer applications packages. They manufacture the pickaxes, lanterns and shovels in this gold rush. They would love it if their job was done when the package was delivered. Unfortunately, that's not the case — that new buyer may not be comfortable with the machine, is usually in a big hurry and probably didn't read the manual. So the vendor gets a telephone call. And then another. As the program's popularity grows, there are more and more calls.

Many vendors have been offering free support up until now, but that is likely to change. Aside from sheer volume, consider the problems that vendors have in handling customer support. Many calls describe problems having little or nothing to do with the applications package itself. For example, the caller may simply not understand subdirectories.

In cases where the problem does have to do with the package, the answer is often in the manual. In those cases where calls are free, there are inevitably users that overdo it and call about every little thing.

More sophisticated callers may have more interesting questions, but those calls may have to do with some arcane aspect of the caller's business that is unknown to the vendor's technical representative. The better the sales, the more calls there will be, but, because support represents a loss of revenue to the vendor, staffing is apt to lag demand. The result is a long queue of impatient customers.

No wonder vendors want to start charging for their trouble. Different fee structures are being considered. So far, there have been proposals for charges by the minute or by the call as well as for a yearly support contract. There will undoubtedly be other ideas. This is where corporate MIS comes in. If your financial organization allows it, there could be charge-back gold in them thar phone calls.

What can you offer that the vendor can't? Familiarity, for starters. Look at your experience in supporting users of your systems. The vendor's technical representative has to handle any kind of configuration that comes down the road and will necessarily have to start the call by getting basic information. Your organization has the advantage of knowing, or at least being able to find out, exactly who has what. As a result, you can be prepared to handle questions more effectively.

Unlike a vendor's ever-increasing volume, your novice users are likely to come in blocks — 20 this month as one department buys, 30 next month as another buys. You should be able to find out from the various departments what packages are being considered and when a decision will be made. In short, you have a more predictable user base; that potentially means better planning, closer margins and lower overhead.

Finally, you can probably offer single-source support, one call for any problem. Your own support people are already experienced in dealing with these users and their quirks. Because they now support the in-house systems, they also know what is available there.

Naturally, there is a lot of preparation to be done before you can make this idea work, but take a hard look at the situation. Suppose one of your own corporate departments is looking for a telephone support contract for its microcomputer users. Who really has the most to offer? Your own support group or a potpourri of vendor reps? Answer the telephone — that's opportunity calling.

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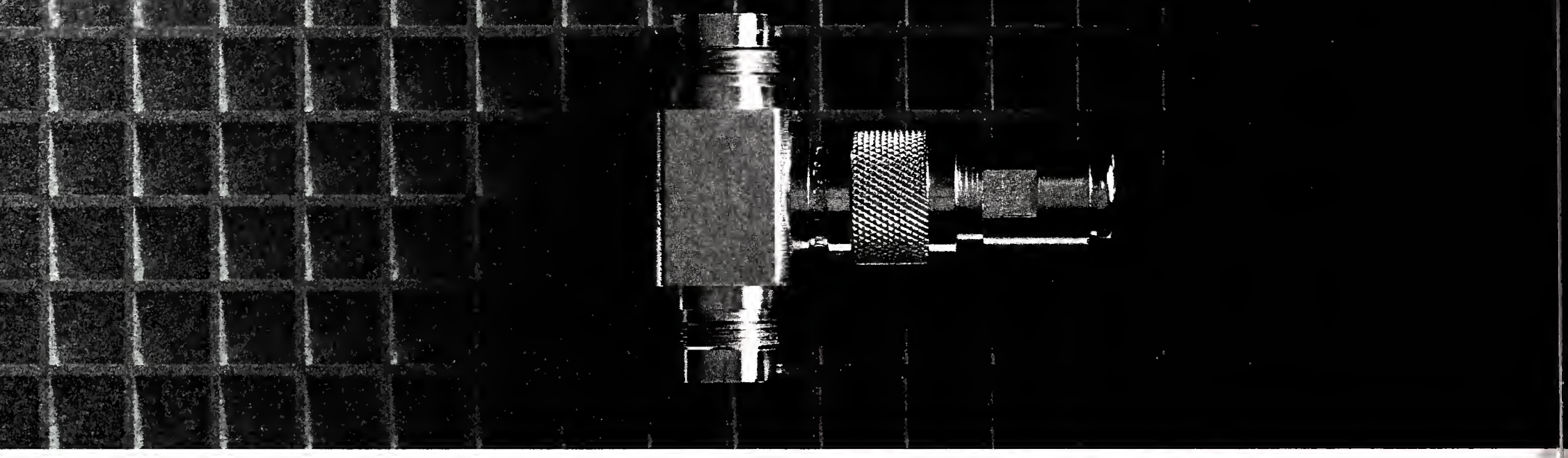

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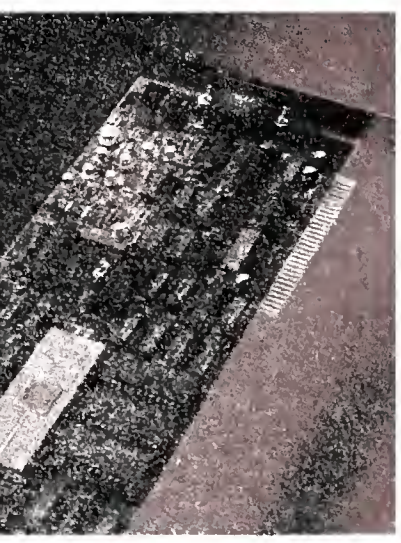

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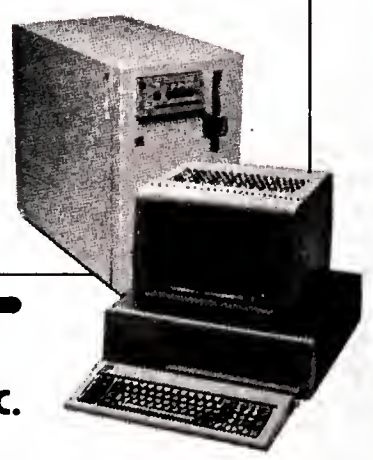

AST RESEARCH INC.

Hardware Roundup

By Donna Raimondi CW Staff

A look at 32 systems from 19 vendors

When Seymour Cray unveiled his Cray-1 supercomputer in 1976, many scoffed at its $7 million price tag, claiming that only a select few would ever be able to afford such an outrageous machine. Scientific computing was thought to be a profession reserved for ivory tower researchers and top secret government think tanks.

The times have changed. In the past three years, scientific — number-crunching-oriented — computing has found its way into many commercial DP shops.

A voracious demand for simulations and modeling, particularly among companies involved in designing highly technical products, has made scientific-oriented processors a staple.

Furthermore, the emerging artificial intelligence genre of applications is opening up marketplaces for parallel processing systems — series of CPUs that can either work on several problems at once or divide one big problem into several smaller parts for more efficient processing.

Users still balk at price

Users clearly still balk at the multimillion-dollar price tag of supercomputers, but more of the highly specialized systems are turning up in what are generally regarded as commercial applications.

Oil exploration firms are using the machines to analyze satellite data; auto manufacturers are using supercomputers to simulate auto crash tests; and the movie industry has discovered supercomputers as an ideal tool to produce highly sophisticated graphics.

Recent high-end mainframe announcements from IBM, Burroughs Corp. and Honeywell, Inc. — all of which have prices pushing the $10 million mark — have softened the sticker shock of supercomputers for some users. But for the many who still cannot justify or who cannot afford a supercomputer, a new niche market has developed.

Systems at a fraction of the speed, price

In recent months, there has been a rash of smaller, scientific-oriented computer systems announced that offer processing capabilities similar to supercomputers but at a fraction of the speed and price.

This week's Hardware Roundup focuses on an admittedly mixed bag of systems. For the first time, supercomputers have been added. The second part of this week's installment is devoted to superminicomputers that appear to have either a scientific bent or that appeal to a specialized audience.

It is in this second group where the distinctions among processor types can become sticky. For example, most vendors in this group claim their systems can be used for both scientific and commercial applications. Vendors of parallel processors, for example, would argue their systems are not so much special purpose but built with special architectures.

Computerworld agrees that the groupings as laid out are not perfect but are designed only to present the systems in some kind of order. The categorizations are not meant to be a buyer's guide but only to enable readers to look at similar systems all in one place.

> *Scientific — number-crunching-oriented — computing has found its way into commercial DP shops. A demand for simulations and modeling has made scientific-oriented processors a staple.*

Four basic types of superminis

Included in this group are four basic types of superminicomputers: scientific oriented, machines with parallel architectures, transaction processing systems and reduced instruction set computer CPUs.

Supercomputers can be defined as machines that have efficient and fast vector processing, usually (but not always) using 64-bit precision. The million floating-point operations per second (Mflops) measurement that sets supercomputers apart from mainframes could arbitrarily be set at the 150 to 200 Mflops range. That definition, however, does not cover machines like Denelcor, Inc.'s Heterogeneous Element Processor, which is a scalar parallel processor that is less powerful than a traditional supercomputer but is significantly more powerful than the average parallel processor.

The past year has produced a crop of new supercomputers.

Cray Research, Inc. introduced its Cray-2, said to be 12 times faster than the Cray-1 machine. Amdahl Corp. unleashed both a low-end model, the 500, and its top-of-the-line 1400 model in one announcement.

Parallel processors

A number of parallel processing machines — including offerings from Encore Computer Corp. and Alliant Computer Systems Corp. — theoretically offer supercomputing power in their largest configurations.

Parallel processors may well be the fastest growing segment of the computer industry. They are used primarily for scientific purposes, as they make excellent number crunchers. Some manufacturers claim that they will be suitable for all kinds of applications once software is available to take advantage of their parallelism.

To that end, researchers are trying to work out methods of unleashing the inherent power in the systems.

Intel Corp., for example, has distributed a number of its iSPC concurrent processors to universities and supercomputer research agencies that will explore applications and algorithms in concurrent processing.

Fault-tolerant transaction processing systems include those manufactured by Tandem Computers, Inc., Stratus Computer, Inc. and Sequoia, Inc.

The past year has been a rough one for the transaction processing vendors. Auragen, Inc. and Synapse, Inc. both fell upon economic hard times. IBM got into the transaction processing act with its System/88, basically a renamed version of the Stratus/32 (hence not included in the Hardware Roundup). Other vendors, such as NCR Corp. and Digital Equipment Corp., also appear to be testing the fault-tolerant waters by developing methodologies for linking current systems in a fault-tolerant configuration.

Reduced instruction set computers — including Ridge Computers and Pyramid Technology Corp. machines — attempt to produce a more efficient system's architecture by streamlining the system instruction set in such a way that most internal operations can be carried out within one machine cycle. The architecture appears to have a bright future but may have some early limitations because of compatibility problems with existing systems using more cumbersome instruction sets.

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HARDWARE ROUNDUP

Supercomputers

Cray Research, Inc.

Characteristics \ System	Cray 2	X-MP
Flops[1]	1.6G	1.4G
Memory Size in Bytes (Minimum-Maximum)	2.04G	8M-64M
Purchase Price (In Millions)	$17.6	$5-$14
Machine Cycle Time (Nsec)	4.1	9.5
Channels (Minimum-Maximum)	4-40	7-42
Cache (Buffer) Size	None[2]	None
Operating System	AT&T Unix System V	Cray COS
Front-End Interfaces	4	7
Bus Architecture	No	No

1. Floating-point operations per second; CW estimates.
2. Has local memory of 512K bytes.

CW Chart

National Advanced Systems Corp.

Characteristics \ System	Unibus 9100 series	Multibus 9100 series
Flops[1]	50M	50M
Memory Size in Bytes	16M	16M
Purchase Price (In Millions)	$1.8-$2.5	$3.8-$4.7
Machine Cycle Time (Nsec)	30-38	30-38
Channels	8 or 16	16
Cache (Buffer) Size	64K-256K	128K-512K
Operating System	IBM MVS/XA, VM/370, MVS/SP	MVS/XA, VM/370, MVS/SP
Front-End Interfaces	None	None
Bus Architecture	No	No

1. Floating-point operations per second; vendor claims.

CW Chart

Denelcor, Inc.

Characteristics \ System	HEP 1500
Mips[1]	16-256
Memory Size in Bytes (Minimum-Maximum)	1M-1G[2] 1M-128M[3]
Purchase Price (In Millions)	$1.4-$4.72
Machine Cycle Time (Nsec)	100
Channels (Minimum-Maximum)	1-128
Cache (Buffer) Size	1K-80K[4]
Operating System	Denelcor HEP/UPX
Front-End Interfaces	No
Bus Architecture	No

1. Million instructions per second; vendor claims.
2. Real memory.
3. Program memory.
4. Not memory cache; it is between data memory and disk devices.

CW Chart

ETA Systems, Inc.

Characteristics \ System	Cyber 205
Flops[1]	50M-800M
Memory Size in Bytes (Minimum-Maximum)	8M-128M
Purchase Price (In Millions)	$6-$15
Machine Cycle Time (Nsec)	20
Channels (Minimum-Maximum)	8-16
Cache (Buffer) Size	None
Operating System	Control Data Corp. Vsos
Front-End Interfaces	1-15
Bus Architecture	No

1. Floating-point operations per second; vendor claims.

CW Chart

Convex Computer Corp.

Characteristics \ System	C-1
Flops[1]	60M
Memory Size in Bytes (Minimum-Maximum)	4M-128M
Purchase Price	$495,000
Machine Cycle Time (Nsec)	100
Channels (Minimum-Maximum)	1-160
Cache (Buffer) Size	64K
Price per 1M Byte of Main Memory	$5,000
Operating System	AT&T Unix 4.2
Number of Processors	1

1. Floating-point operations per second; vendor claims.

CW Chart

Amdahl Corp.

Characteristics \ System[1]	500	1400
Flops[2]	133M	1.14G
Memory Size in Bytes (Minimum-Maximum)	Up to 128M	64M-256M
Purchase Price (In Millions)	$4.9-$9.7	$12.5-$21.8
Machine Cycle Time (Nsec)	7.5	7
Channels	16 or 32	16 or 32
Cache (Buffer) Size	32K[3]	128K[3]
Operating System	Fujitsu Ltd. VSP	VSP
Front-End Interfaces	Not available	Not available
Bus Architecture	No	No

1. These are low- and high-end machines; the company has two others in between.
2. Floating-point operations per second; vendor claims.
3. Vector register storage.

CW Chart

HARDWARE ROUNDUP

Specialized superminicomputers

Encore Computer Corp.

Characteristics \ System	Multimax
Relative Performance[1]	86-748
Mips[2]	1.5-15
Memory Size in Bytes (Minimum-Maximum)	4M-32M
Purchase Price	$125,000-$600,000
Machine Cycle Time (Nsec)	100
Channels (Minimum-Maximum)	1-10
Cache (Buffer) Size	32K per processor
Price per 1M Byte of Main Memory	Not available
Operating System	AT&T Unix 4.2 and Unix System V
Number of Processors	2-20

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.

CW Chart

Tandem Computers, Inc.

Characteristics \ System	Nonstop TXP	Nonstop EXT	Nonstop II	Nonstop 1+
Relative Performance[1]	258-2,064	93-186	93-744	68-544
Mips[2]	4-32	1.6-3.2	1.6-12.8	1.4-11.2
Memory Size in Bytes (Minimum-Maximum)	4M-128M	2M-32M	2M-128M	1M-32M
Purchase Price (Memory Size)	$322,000 (4M)	$120,000 (2M)	$155,000 (2M)	$89,000 (1M)
Machine Cycle Time (Nsec)	83	100	100	100
Channels (Minimum-Maximum)	32-256	32-64	32-256	32-256
Cache (Buffer) Size	128K-1M	None	None	None
Price per 1M Byte of Main Memory	$4,900[3]	$7,500[4]	$7,500[4]	$7,500[4]
Operating System	Tandem Guardian	Guardian	Guardian	Guardian
Number of Processors	2-16	2-4	2-16	2-16

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual relative performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.
3. Based on an 8M-byte increment costing $39,200.
4. Based on a 2M-byte increment costing $15,000.

CW Chart

Intel Corp.

Characteristics \ System	iPSC
Relative Performance[1]	1,218-4,874
Mips[2]	25-100
Memory Size in Bytes (Minimum-Maximum)	16M-64M
Purchase Price	$150,000-$520,000
Machine Cycle Time (Nsec)	250
Channels (Minimum-Maximum)	1-3
Cache (Buffer) Size	None
Price per 1M Byte of Main Memory	Not applicable
Operating System	Microsoft Corp. Xenix
Number of Processors	32-128

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.

CW Chart

Sequoia Systems, Inc.

Characteristics \ System	Sequoia
Relative Performance[1]	175-2,390
Mips[2]	2.5-50
Memory Size in Bytes (Minimum-Maximum)	4M-256M
Purchase Price (Memory Size)	$200,000 (4M)
Machine Cycle Time (Nsec)	100
Channels (Minimum-Maximum)	2-96
Cache (Buffer) Size	128K[3]
Price per 1M Byte of Main Memory	$8,500
Operating System	AT&T Unix 4.2 and Unix System V
Number of Processors	2-64

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.
3. Per processor.

CW Chart

Sequent Computer Systems, Inc.

Characteristics \ System	Baiance 8000
Relative Performance[1]	100-428
Mips[2]	1.4-7
Memory Size in Bytes (Minimum-Maximum)	2M-28M
Purchase Price	$50,000-$250,000
Machine Cycle Time (Nsec)	100
Channels	16
Cache (Buffer) Size	8K[3]
Price per 1M Byte of Main Memory[4]	$3,800
Operating System	Sequent Dynix
Number of Processors	2-12

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.
3. Per CPU.
4. Based on an 8M-byte increment costing $31,600.

CW Chart

Flexible Computer Corp.

Characteristics \ System	Flex/32
Relative Performance[1]	68[2]
Mips[3]	1[2]
Memory Size in Bytes (Minimum-Maximum)	2,128M-92.3M
Purchase Price	$126,000
Machine Cycle Time (Nsec)	600
Channels (Minimum-Maximum)	1[2]-20
Cache (Buffer) Size	4K[2]
Price per 1M Byte of Main Memory	$6,000
Operating System	Flexible Mmos or AT&T Unix System V
Number of Processors	2-20

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Per processor.
3. Million instructions per second; CW estimates.

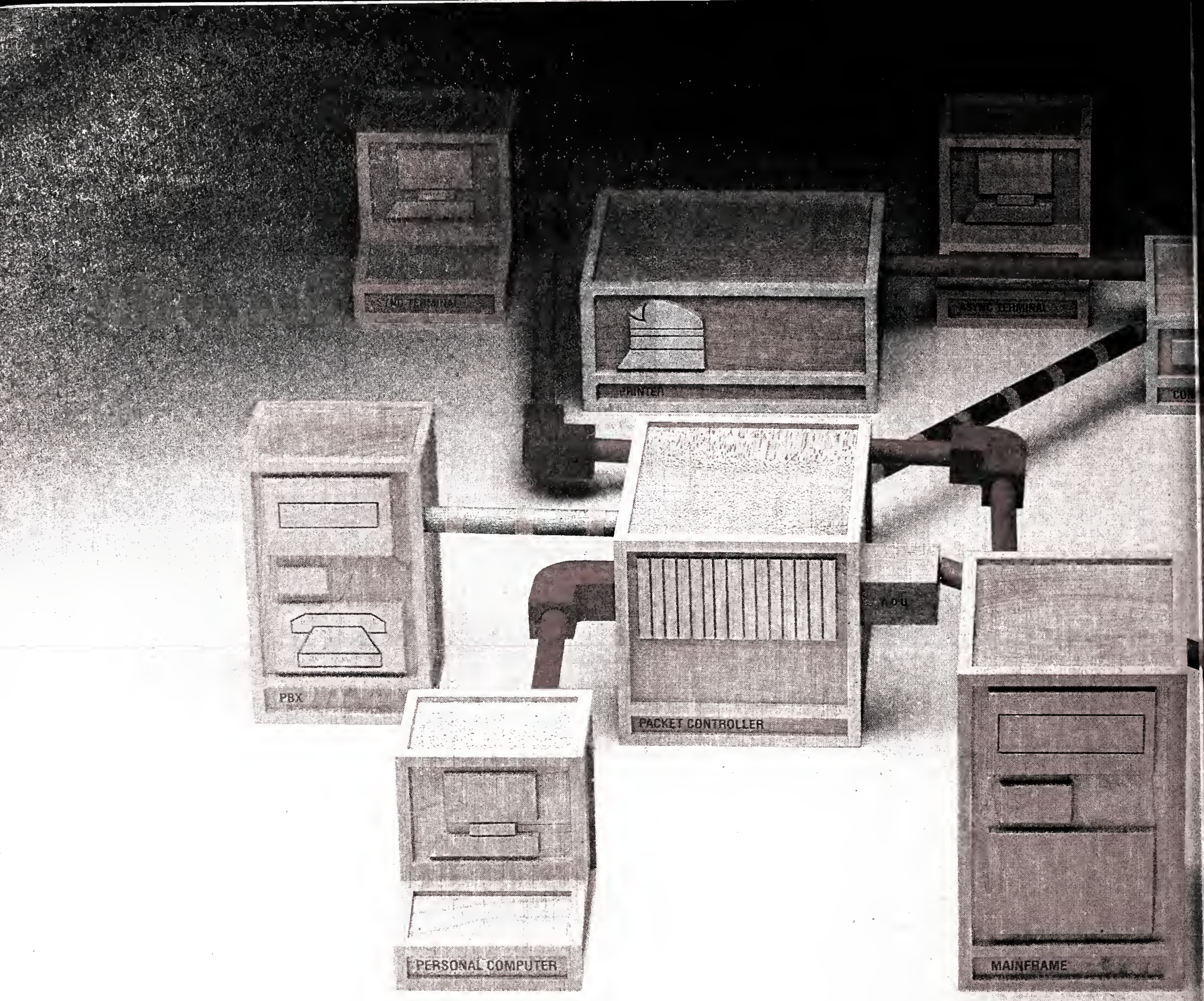
CW Chart

Norsk Data AS

Characteristics \ System	500 CX series
Relative Performance[1]	488
Mips[2]	7
Memory Size in Bytes (Minimum-Maximum)	1.5M-168M
Purchase Price	$100,000
Machine Cycle Time (Nsec)	120
Channels (Minimum-Maximum)	1-4
Cache (Buffer) Size	64K
Price per 1M Byte of Main Memory	$10,000
Operating System	Norsk Sintran or AT&T Unix 4.2
Number of Processors	2-17
Bus Architecture	Yes

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.

CW Chart



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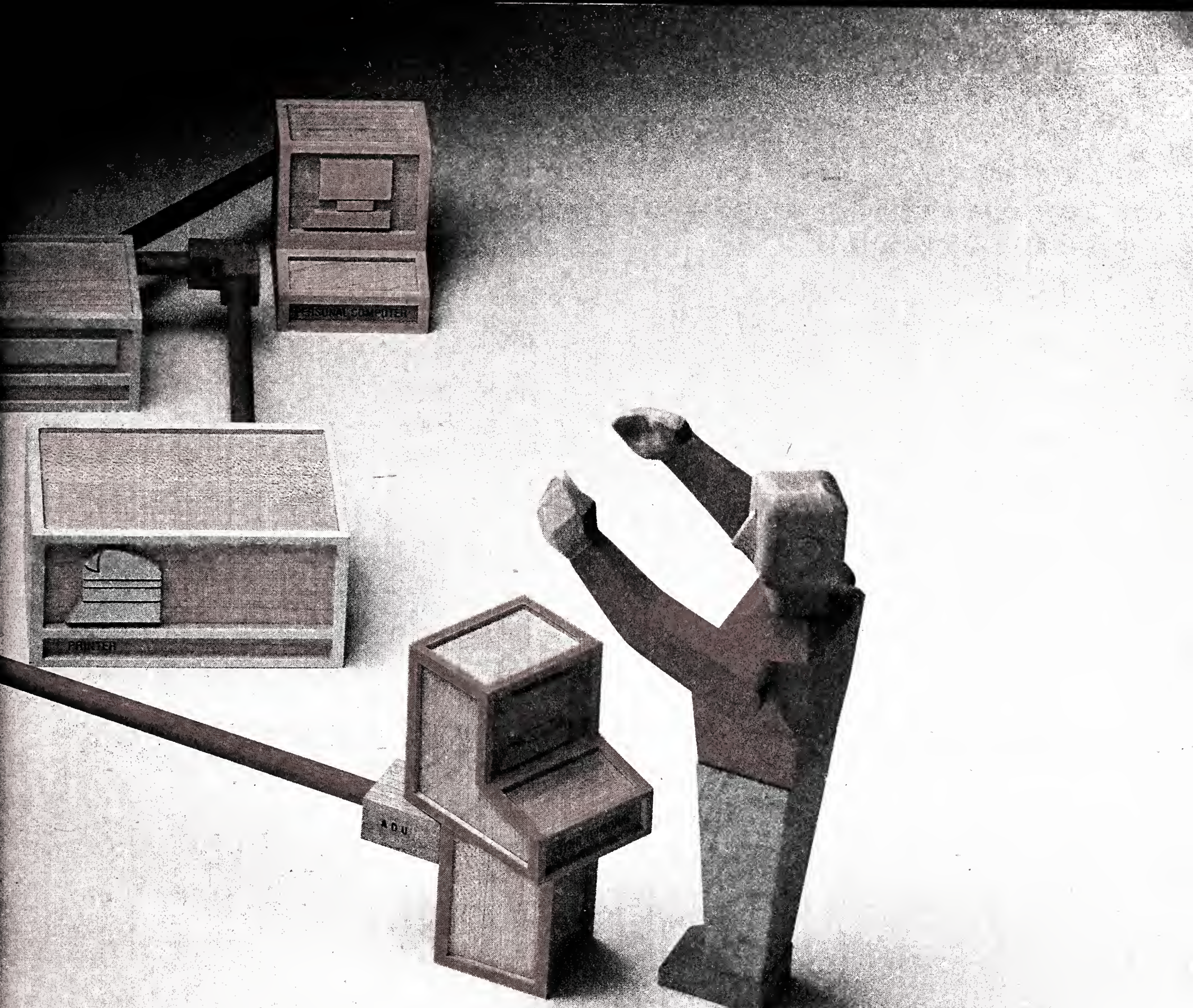

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HARDWARE ROUNDUP

Specialized superminicomputers

Ridge Computers

Characteristics \ System[1]	100 family	300 family
Relative Performance[2]	40	40
Mips[3]	0.7	0.7
Memory Size in Bytes (Minimum-Maximum)	4M-8M	4M-8M
Purchase Price	$39,000-$75,000	$56,000-$100,000
Machine Cycle Time (Nsec)	125	125
Channels	8	16
Cache (Buffer) Size	256 bytes	256 bytes
Price per 1M Byte of Main Memory	$3,250	$3,250
Operating System	ROS	ROS
Number of Processors	1	1

1. Reduced instruction set computer CPUs.
2. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and achitectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
3. Million instructions per second; CW estimates.
4. Based on a 4M-byte Increment costing $13,000.

CW Chart

Stratus Computer, Inc.

Characteristics \ System	Stratus/32 FT 200	Stratus/32 XA 400	Stratus/32 XA 600
Relative Performance[1]	74	170	255
Mips[2]	0.9	2	3
Memory Size in Bytes (Minimum-Maximum)	2M-8M	4M-16M	4M-16M
Purchase Price (Memory Size)	$115,000 (4M)	$185,000 (4M)	$270,000 (4M)
Machine Cycle Time (Nsec)	125	125	125
Channels (Minimum-Maximum)	1-24	1-24	34
Cache (Buffer) Size	None	None	48K
Price per 1M Byte of Main Memory	Not available	Not available	Not available
Operating System	Stratus VOS or AT&T Unix System V	VOS or Unix System V	VOX or Unix System V
Number of Processors	2	4	6

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual relative performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.

CW Chart

Pyramid Technology Corp.

Characteristics \ System	98X[1]
Relative Performance[2]	265
Mips[3]	5.4
Memory Size in Bytes (Minimum-Maximum)	8M-32M
Purchase Price	$260,000-$500,000
Machine Cycle Time (Nsec)	100
Channels	4
Cache (Buffer) Size	4K[4] 32K[5]
Price per 1M Byte of Main Memory[6]	$5,000
Operating System	Pyramid OSX
Number of Processors	2-4

1. Reduced instruction set computer CPUs.
2. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
3. Million instructions per second; CW estimates.
4. Instruction cache.
5. Data cache.
6. Based on a 2M-byte increment costing $10,000.

CW Chart

Elxsi

Characteristics \ System	System 6400
Relative Performance[1]	26-2,750
Mips[2]	6-60
Memory Size in Bytes (Minimum-Maximum)	8M-192M
Purchase Price	$369,000-$1.5 million
Machine Cycle Time (Nsec)	50
Channels	128
Cache (Buffer) Size	16K
Price per 1M Byte of Main Memory[3]	$6,500
Operating System	Elxsi Embos
Number of Processors	1-10

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.
3. Based on an 8M-byte increment costing $52,000.

CW Chart

Computer Designed Systems, Inc.

Characteristics \ System	Advisor 32/60	Advisor 32/80	1400/32	1800/64
Relative Performance[1]	198	475[2]	130	172
Mips[3]	4.2	14.6	2.6	3.5
Memory Size in Bytes (Minimum-Maximum)	256K-6M	256K-8M	256K-16M	256K-16M
Purchase Price[4] (Memory Size)	$290,000 (1M)	$290,000 (1M)	$263,000 (256K)	$326,000 (256K)
Lease Price (Lease Term)	None	None	None	None
Machine Cycle Time (Nsec)	125[5]	125[5]	200	100
Channels (Minimum-Maximum)	16-128	16-128	612	612
Cache (Buffer) Size	256K	256K	16K	32K
Bus Architecture	Yes	Yes	Yes	Yes
Price per 1M Byte of Main Memory	$62,000	$62,000	$24,800	$24,800

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual relative performance may vary with the application, peripherals and software.
2. The 32/80 processor is available with an 80M-byte, 50-nsec read-only memory that reportedly enhances performance.
3. Million instructions per second; vendor claims.
4. Includes processor, console, power supply and all prerequisites.
5. A performance enhancement feature is available that reduces the machine cycle time to 75 nsec.

CW Chart

Alliant Computer Systems Corp.

Characteristics \ System	FX/8	FX/1
Relative Performance[1]	1,624	260
Mips[2] (Flops[3])	4.45-35.6 peak (94M peak)	4.45 (11.8M)
Memory Size in Bytes (Minimum-Maximum)	8M-64M	8M-16M
Purchase Price	$270,000-$1 million	$132,000 base
Machine Cycle Time (Nsec)	Not available	Not available
Channels (Minimum-Maximum)	1-12	1-2
Cache (Buffer) Size	64K-128K[4] 32K-128K[5]	32K
Price per 1M Byte of Main Memory	Not available	Not available
Operating System	Alliant Concentrix	Concentrix
Number of Processors	1-8	1

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158 Model 3 equaling 45. These numbers are designed to put the processor into perspective with other systems; they do not constitute a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and, therefore, cannot be directly compared. In addition, actual relative performance may vary with the application, peripherals and software.
2. Million instructions per second; CW estimates.
3. Floating-point operations per second; CW estimates.
4. Memory cache.
5. I/O cache.

CW Chart

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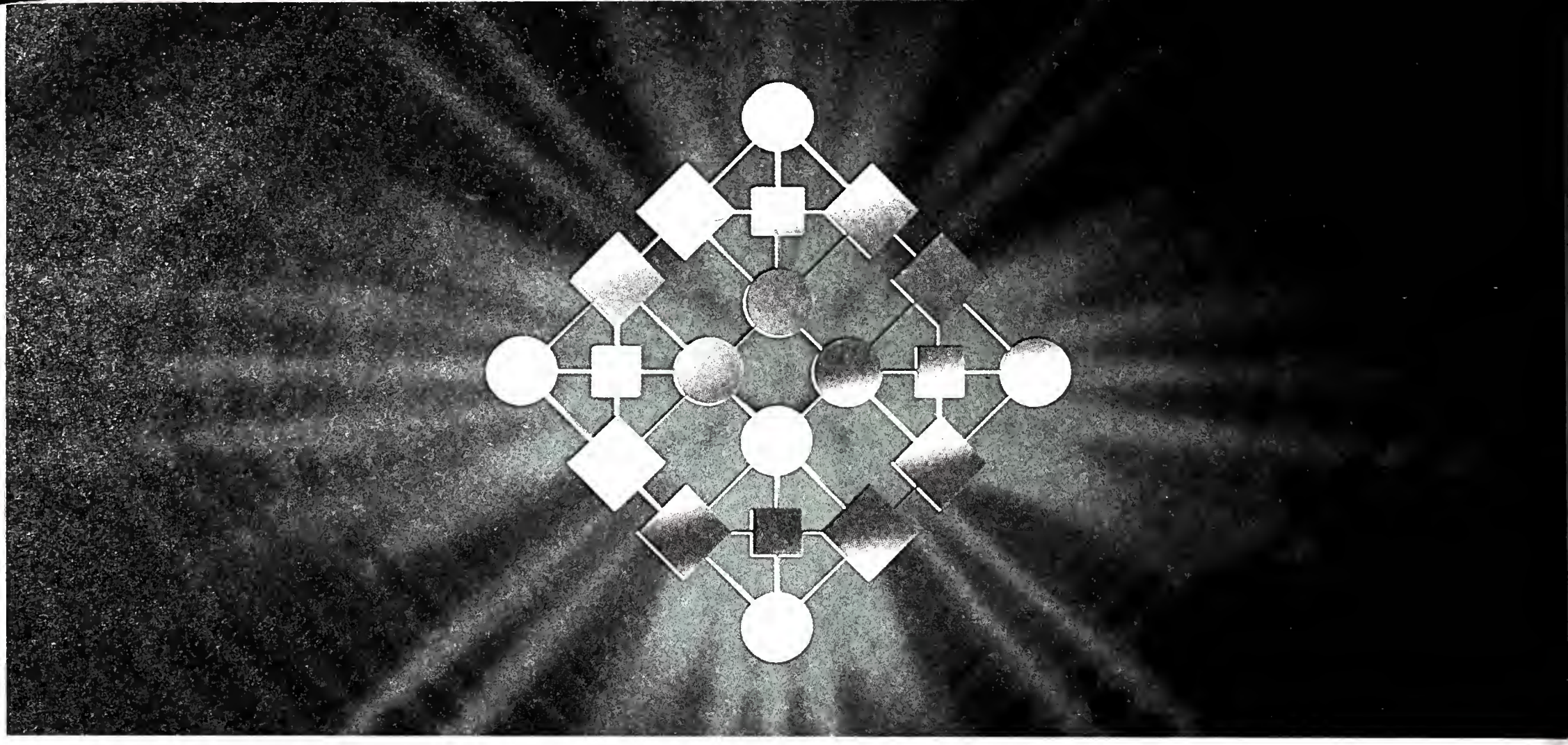

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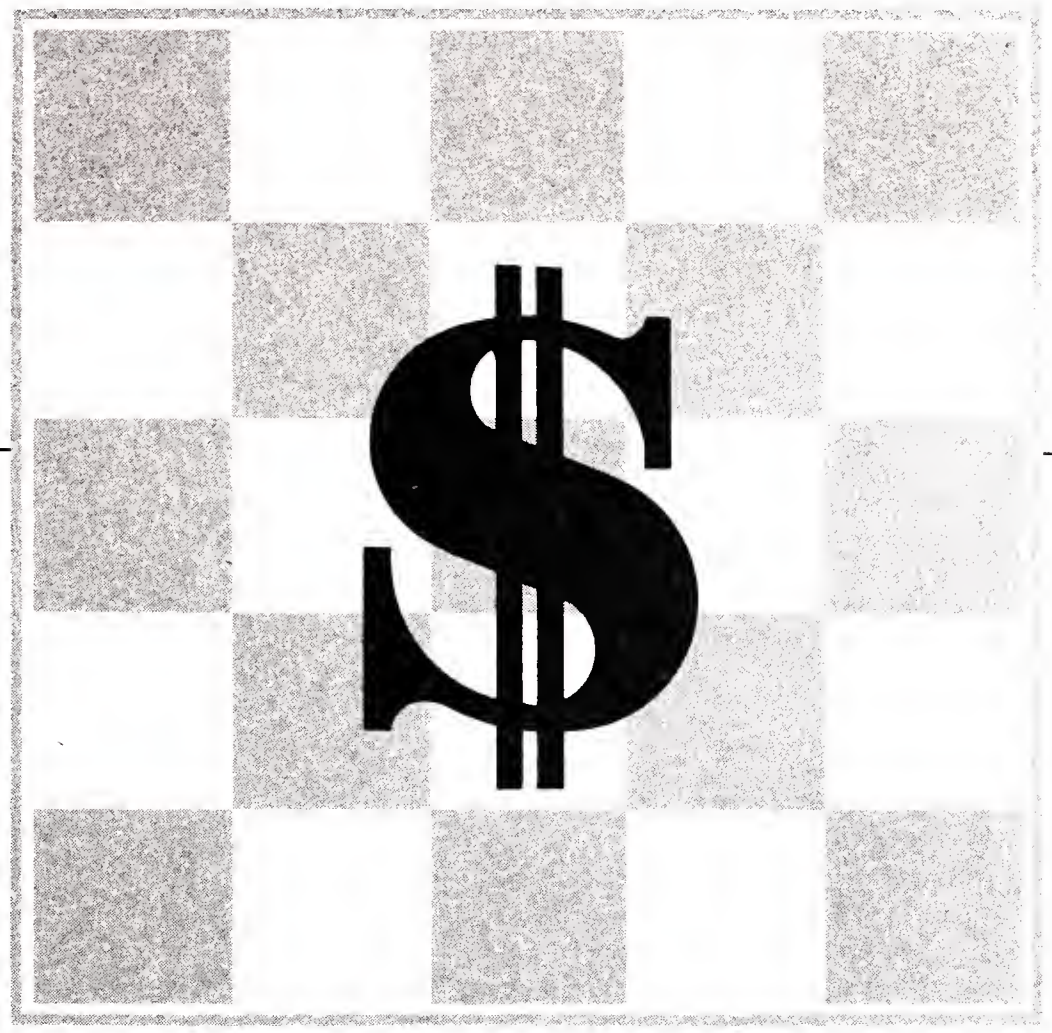


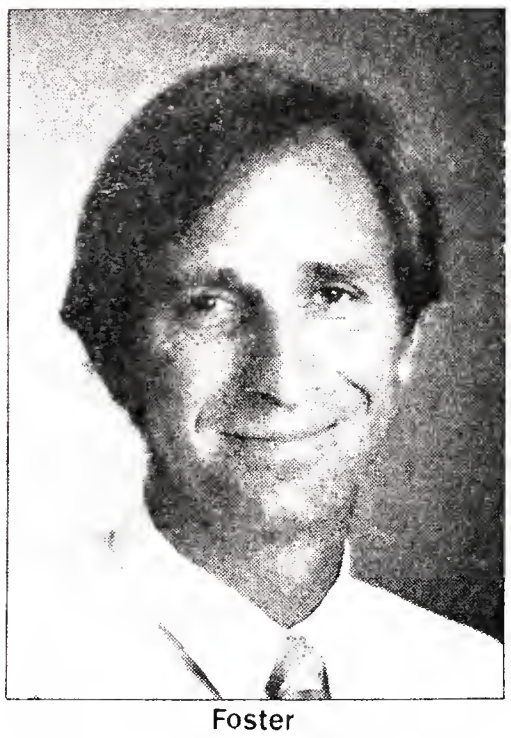
High-tech directorates: The Board Game

By James Connolly
Special Projects Editor

John Cullinane, where are you?

A suddenly successful, five-year-old minicomputer manufacturer that just went public needs help. The young company's chief executive officer is unsure how to manage 40% annual growth. Headhunters are recruiting his key technical people. His product is a star today but may be forgotten tomorrow, so he must envision new product lines into the 1990s.

The manufacturer and CEO here are fictitious, but if real they would need the guidance and advice of an executive who has survived start-up, boom and stabilization. The company would have a seat on its board of directors for a John Cullinane, chairman of Cullinet Software, Inc., or a similar executive who has practical



Foster

business experience and knows the high-technology marketplace.

"If I am going to add someone, I want someone who has faced the problems that I am going to be facing over the next few years," says Stratus Computer, Inc. President William Foster. "If now and then a person came along with very good experience, then we might take him on. We would look at a chief executive officer who has been through the rapid growth we are going through, which probably means it would be someone from the high-tech field."

Foster, whose Marlboro, Mass., company produces fault-tolerant superminicomputers, was the first of three computer company executives to cite "someone like John Cullinane" as the type of director who could help them manage their firms.

The demand for board members with experience in high-tech management is one trend emerging from computer company boardrooms, where decisions are made that affect not only each company but also the industry, the user-customer, the investor and the communities where the company operates.

A board of directors — an often unrecognized entity — faces decisions as outwardly simple as upgrading an employee benefit package or as complex as firing the CEO or withdrawing investments from South Africa.

Typically, a board meets every other month to perform such tasks as reviewing budgets, receiving briefings on new products and planning corporate expansion. In addition to regularly scheduled meetings, directors sit on specialized committees that focus on such topics as audits or compensation. These committees of three or four perform much of the preliminary work and fact-finding for the board as a whole.

A job as director can approach the status of volunteer work for wealthy executives. Directors typically receive stipends that may total $30,000 to $50,000 per year plus travel expenses. In some less successful companies, the pay consists only of risky stock options.

The composition and powers of boards of directors in the computer industry vary greatly, determined by factors such as company size, philosophy, age and recent business success.

"Today there is a trend toward much more activism and involvement [with their companies] on the part of the boards, a trend to awareness," observes David Francis, a partner in the New York executive recruiting firm Heidrick & Struggles, Inc.

Throughout American industry for at least two decades there was a well-publicized critical view of boards as the heart of the old-boy network, where company presidents filled paneled boardrooms with near-comatose, white-haired men-friends who blindly endorsed the CEO's actions.

Away from old-boy network

"Corporate governance is getting away from the old school ties. The criticism used to be that becoming a director depended upon how well you knew the CEO, not what you had to offer," says Northwestern University Professor of Management James Worthy, a director of Control Data Corp. Worthy is coauthor of *Emerging Issues In Corporate Governance* (1983, Northwestern University Press).

Francis notes that while many corporations are accepting a variety of people, that doesn't necessarily apply at computer companies.

He says, "It is certainly true that doors are opening for new board members such as professionals, women and minorities. But I think this is more a function of potential board liability than of social activity. Companies recognize that they no longer can have boards that just nod and rubber-stamp when the CEO acts. They want to be more representative of the community."

The liabilities Francis cites include not only societal pressures — such as those exerted by the news media, community groups or stockholders — but also financial liabilities if the company is sued.

"But it's the more traditional industries that may be more interested in maintaining a balance on the board, making sure that there are minorities or females or academicians on the board," he adds. "With technical product companies like computer companies, there is more interest in bringing in people who can contribute on the shorter term, technical people who, even if they can't design a supercomputer, have an appreciation of the market and what the technology business is all about. You have to remember that these companies are in a very dynamic market with short product life cycles."

Comparative youth and the dynamics of the market have left computer companies with boards of directors that are far different from those of banks and manufacturers

founded at the turn of the century. Only the boards of the most established computer companies, such as IBM, resemble the directorates of more traditional industries.

A company may originally be little more than a founding engineer working on a handshake with seed money provided by a couple of friends, notes George McQuilken, founder of Spartacus Computers, Inc. and now CEO of Language Technologies, Inc., a Salem, Mass., software service firm. "For a start-up company, the time to get serious about your board of directors is when you get your first outside investment," he says.

McQuilken says Spartacus, which he left in 1984, was lucky in that no strings were attached to its first infusion of cash. "[Nixdorf Computer Corp.] was our first major source of capital. . . . What was interesting was that Nixdorf's role was to ask for no role in the company."

Money means seats

Unlike Nixdorf, subsequent investors in Spartacus wanted seats on the board of directors. When six venture capital firms posted a $3 million investment, they demanded three seats on the seven-member board.

McQuilken, another employee and another founder filled three others, and the remaining seat was filled by consensus among the first six.

McQuilken cautions that a start-up should ensure that it has an experienced outside computer industry executive on its board and that its agreements with venture capitalists specify who will represent the investors on the board. Such agreements can prevent the investors' seats from being filled by junior executives of the venture capital firms — executives who don't command the investment community respect accorded senior executives.

Stratus' Foster says, "Most of these companies get started with the help of venture capitalists, who usually want a place on the board. When the companies were private, they generally owned a certain percentage of the stock. After the companies went public, the venture capitalists could choose to stay on if the company continued to go well."

The investor viewpoint

Stratus director Paul Ferri, general partner of Matrix Partners of Boston and one of three venture capitalists on the Stratus board, says that the challenge for a director with a company like Stratus is in "maintaining the entrepreneurial spirit."

He notes, "Our role is an advisory one. It's one where we bring ideas to a company. We're not involved in the day-to-day operations, so we can be more detached in developing ideas."

While the boards of young companies are dominated by venture capitalists, those investors don't always leave four or five years down the road.

At Digital Equipment Corp., four members of the seven-person board — a small directorate for a 28-year-old, $5.5 billion company — have links to the company's venture capitalization in the years before DEC went public in 1966.

Employee input

DEC, like Stratus, is also exceptional in that only one company employee, President and CEO Kenneth Olsen, sits on the board. "He feels we can contribute to board discussions without being voting members. It's one less status symbol. Being a member of the board can turn into that," says Winston Hindle Jr., DEC's vice-president for corporate affairs.

Foster says that at Stratus, he excludes other employees from the board to prevent them from participating in decisions that directly affect themselves.

Of the 127 directors on the boards of 10 leading computer companies, only 38 are current or former company employees. Almost as many are executives with other corporations.

One director who differs with the idea of excluding employees is CDC's Worthy. He says, "I think it is important; in the computer industry in particular, it is very useful to have a strong representation of inside directors because of the technology involved.

"I assure you, as a management person myself, that it is very comforting to have an inside director who knows the technology. It's important that they work with you as a peer, not as

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someone who comes in to make a report and then goes out. They should sit with you and share the responsibility."

Just as directors and executives differ on who should sit on boards, the selection process differs from one company to the next, although the formal process usually has the CEO offering stockholders a slate of candidates for election at the annual meeting.

At some firms, directors are chosen because the CEO has worked with them before. In others, directors recommend directors, as when Ferri suggested that Foster take on Alexander d'Arbeloff, founder of Boston-based test equipment manufacturer Teradyne, Inc. Still others use executive search firms such as Francis' to find directors.

While lawmakers periodically file bills that would set guidelines for governing boards of directors, the primary restrictions remain a Securities and Exchange Commission ban on directors sitting on competitors' boards and a New York Stock Exchange requirement that firms listed on the exchange maintain an audit committee of outside directors.

Worthy notes that interlocking boards — the practice of executives sitting on each others' boards — may have once been popular but is now "very unimportant" — neither a positive nor a negative influence.

However, it is still common to see directors of a single company coming from the same colleges, belonging to the same clubs and working for the same social organizations. Some

Burroughs: the board view

No butchers, no bakers, no candlestick makers sail on the $4.8 billion ship named Burroughs. But there is still a healthy mix of occupations present when the 12 directors of Burroughs Corp. gather in Detroit every other month.

Typical of a mature computer company, and of today's corporations in general, the Burroughs board comprises former public officials, attorneys, financial experts and industrialists. While Burroughs management refuses comment on how it chooses its directors, biographical references provide a glimpse of how the directors bring different backgrounds and where their career paths have crossed.

A quick look at the board shows the following:

■ The work experience of the 12 directors, whether as employees or directors, extends to more than 40 corporations.

■ Four members hold law degrees, one is an economist, one is a banker, several rose through the corporate ranks in industry, and one — Harold Shapiro — is president of the University of Michigan.

■ The directors earned undergraduate and nonhonorary graduate degrees from more than 20 colleges, including Northwestern, Harvard and Princeton.

■ The board members have experience in at least nine state and federal agencies, including William Milliken's 14 years as governor of Michigan and Chairman W. Michael Blumenthal's three years as U.S. treasury secretary.

A Burroughs director since 1977, James Fletcher, former president of the University of Utah, is now a distinguished public service professor at the University of Pittsburgh. But most of his work experience is in engineering and relates to the space program dating back to the 1950s. He left his post as administrator for the National Aeronautics and Space Administration in 1977 and was approached by Mirabito and other Burroughs officials.

"I had been familiar with Burroughs since I reviewed a bid they made on an ICBM project back in 1955 and 1956. But the reason they wanted me was that I knew something about the government data processing business, and around 1977 they wanted to get into that field," he notes.

Like most directors throughout industry, Fletcher carries to the boardroom not only his work experience but also his experience as a director in other companies. Several corporate executives interviewed indicated that such connections don't translate into increased sales to the other companies that a director serves but that the links give all of the firms involved insights into the business climate and the needs of potential markets.

The connections also provide directors with more experience in boardroom settings and in dealing with issues such as budgets, mergers, stock offerings and strategic planning.

Fletcher, 65, also serves as a director of electronics manufacturer Fairchild Industries, Inc., petroleum giant Amoco Oil Co., a space shuttle payload servicer named Astrotech International Corp., manufacturer Special Metals Corp. and software developer Comarco, Inc. In addition, he is a trustee of the Rockefeller Foundation and a member of the Defense Sciences Board and is on the governing bodies of the National Academy of Engineering and the Argonne National Laboratory.

Burroughs is atypical in that so many of its directors have held high-ranking government posts — Blumenthal, Fletcher, Milliken, former U.S. Solicitor General and U.S. Circuit Court of Appeals Judge Wade McCree Jr., former Assistant Solicitor General Charles Barber and former Congressional Budget Office Director Alice Rivlin.

But Fletcher says that government service isn't a prerequisite for service on a board. "I think the number of public service people at Burroughs is accidental. I believe it occurred only because those were people that Mike Blumenthal knew when he came here."

overlap is natural because of regional considerations. For example, California's Hewlett-Packard Co. board is dominated by alumni of a local college — Stanford University — and Boston-area boards are packed with Harvard University and MIT graduates.

Celebrity directors

Heidrick & Struggles' Francis notes that former government officials are added to boards in part for their public relations value and in part because of their familiarity with the government machinery. Two of the more sought-after personalities are former President Gerald Ford and former Secretary of State Henry Kissinger, he says.

Celebrities appear occasionally on the boards of high-tech firms. Cullinane added former hockey star Bobby Orr to the Cullinet board after meeting him during a golf tournament. Within months of U.S. Sen. Paul Tsongas' (D-Mass.) announcement of his retirement last year, he was named a director of Wang Laboratories, Inc.

At Sperry Corp., five out of 10 directors are executives with other corporations, with little apparent emphasis on government experience. But at IBM, six out of 21 directors listed in the 1984 annual report were former Cabinet-level officials.

CDC's 18 directors come from eight major backgrounds — CDC, other corporations, finance, law, education/research, medicine, consulting and government.

Board power

While most executives and directors won't publicly describe their boards as either weak or strong, boards should remain as advisory committees, Worthy observes.

"Typically, the chief executive officer pretty well calls the shots," he says. "He has a large influence on the composition of the board, and the way he relates to the board pretty much defines how the board is going to act. He should be the one who pretty much calls the shots because he is the one who is there every day and is most familiar with the company. But one thing happening in general with respect to power is a shift in the center of gravity to move some of that power toward the board but not to where the power actually rests with the board."

Worthy notes that areas where board power is increasing are in the selection of the chief executive's successor and in strategic planning, particularly in trying to balance long-term and short-term goals. He says that CEOs, who tend to reach the top a few years before retirement and feel pressured to leave their mark quickly, and outside directors lacking in technical skills may be too wary of innovative, risky, long-term ventures. He suggests both may sacrifice innovation in view of the stockholders' demand for near-term return on investment.

Part of planning long-term strategy is the director's assistance in choosing new directors — which Worthy says has happened more frequently in the past five years — and in choosing a successor to the CEO.

Burroughs Corp. director James Fletcher was involved in the 1979 hiring of former U.S. Treasury Secretary and Bendix Corp. executive W. Michael Blumenthal as Burroughs CEO. Fletcher notes, "The toughest decisions as a director are always who the officers of the company are going to be. In the case of Burroughs, we felt that we had to go outside the company to get a CEO.

> *It is still common to see directors of a single company coming from the same colleges, belonging to the same clubs and working for the same social organizations.*

"Another tough question comes when the CEO can't do the job, which is something we haven't faced at Burroughs. Every time you hire a CEO, you raise the question of what direction the company is going in. Your responsibility is clear. You want to make sure the shareholders are getting their money's worth. That's the mandate. You do have to consider questions like social good, but that's secondary."

Even when fully staffed, the board can be expected to change. McQuilken advises that a board should evolve with the company as the firm moves from its entrepreneurial or start-up stage through its initial sales stage and into maturity.

Hindle says DEC is at that more mature stage, and its board is expanding to handle new challenges. "We feel that as we get larger we have more need for advice and counsel from people who have large-company experience," he says. Olsen took a step in that direction five years ago by adding Ford Motor Co. CEO Philip Caldwell.

However, finding an executive to take a board seat can be the challenge, McQuilken adds. He says that one good thing about venture capitalists is that they regularly attend their board meetings. Outside directors, particularly busy executives, may not have the time when dealing with their own companies, social organizations and other directorships. McQuilken, another who mentioned the name of Cullinane, says, "It's like town government. If you have something that has to be done, you have to ask a busy man."

SOFTWARE & SERVICES

SOFTALK
John Desmond
Senior Staff Writer

Join command bolsters CPF

The recently announced Release 7 of the CPF operating system for IBM's System/38 [CW, June 24] is notable for the addition of the Join operator command to the System/38's relational data base management system.

The Join command is one of three core requirements of a relational DBMS as outlined by Edgar F. Codd, an IBM Fellow of the San Jose Research Laboratory in California, who originated the relational model. When accepting the Association for Computing Machinery's Turing Award in 1981, Codd said relational DBMS technology provides a practical way for DP departments to attack two major problems.

One problem is the need to put corporate data stored in computers directly into the hands of end users. The other is to increase the productivity of DP professionals in the development of application programs. Only by achieving these goals will DP departments meet the rapidly growing demand for new applications, Codd stated.

Robert N. Goldman, president of Culinet Software, Inc., the leading independent DBMS vendor, contends that while a true relational system requires a Join command, not all DBMS that claim to be relational have it. "Everyone wants to buy relational, so every DBMS has become relational," Goldman observed.

The Join command allows fields from separate records to be linked together as if they were one. Many IBM programmers worked long hours to bring this function to Release 7, according to David Anderson, IBM's System/38 product manager. For performance rea-

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SOFTLINE/RICHARD FOX

Single vendor: Boon or bane?

Several months ago, an article appeared in this column extolling the virtues of a one-vendor software solution [CW, May 20].

Any software vendor offering more than a single product will naturally emphasize and extoll the virtues of installing all of its products. The justifications for doing this include the following: only one vendor will have to be dealt with when maintenance problems arise; and, of course, lease or rental agreements can be made more attractive when multiple products are installed.

The trend toward the installation of multiple, related offerings from one software vendor can only be expected to increase and intensify because of the current merger and acquisition fever in the software industry and because of the potential advantages offered by integrated packages.

What does this trend toward a one-vendor solution to the software needs of the data center mean for the DP manager or MIS director charged with acquiring and implementing such software? On the one hand, it would seem to make the selection, installation and use of software much simpler — the DP manager simply selects a vendor and then purchases whatever packages that vendor offers.

But the availability of such a "total solution" raises significant questions. The supposed increase in the ability of packages from the same vendor to work

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Fox was recently laid off from his position as data center manager at the Bostitch Division of Textron, Inc. He is, in his own words, currently available.

IBM Profs users speak out

By John Desmond
CW Staff

BERKSHIRE, England — The major strength of IBM's Professional Office System (Profs) is its electronic mail features, and its primary weakness is that it is difficult to use.

That was the conclusion of a recent survey of 45 U.S. Profs users conducted by Xephon Technology Transfer, Ltd. Among the survey's other major findings were the following:

■ The change to Profs most sought after by end users is improved word processing capabilities. Profs' document management facilities were given a low rating. Users said the DCF and the GML were overly complex. Several respondents commented that a word processing product based on IBM's Displaywriter would be a better solution.

■ Users of the VM operating system were attracted to Profs because it works with the IBM 3270 terminals they already have in place, which makes unnecessary costly specialized office automation equipment for sending electronic mail.

■ The system's electronic mail capabilities were given the highest marks by users, followed by the diary/calendar and conference scheduling tools and the proofreading aids, which include a spelling checker and a stylistic aid.

■ Profs users ranged from managers to secretaries, and most were regular users as opposed to occasional users. By department, most Profs users were members of the DP staff. "VM has always been popular in DP circles and Profs appears to be following in this tradition," the survey stated.

In addition to enhancements to word processing, users sought improvements to the system's document storage and retrieval tools, specifically the ability to perform full text searches. Dasd management was reported to be an operating problem

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■ Softscope, a compendium of news from the software industry front/**46**

■ The Guide users group reacts to IBM's release of an enhanced version of CICS/**46**

■ SPSS unveiled the SPSS Tables data analysis and formatting package for IBM and Digital Equipment computers/**46**

■ Tandem Computers strengthened the language support for its Nonstop processors/**48**

INSIDE

Systems Software/**52**

Application Packages/**54**

SOFTSCOPE

Notes from the software industry front

Digital Equipment Corp. has joined with **Coefficient Systems Corp.** to distribute New York-based Coefficient's Vterm II communications software through DEC's Digital Distributed Software program. Vterm II enables users of the IBM Personal Computer, Personal Computer XT and AT to communicate with DEC VAX and PDP minis.

■

Digital Equipment Corp. and **Signal Technology, Inc.** (STI) of Goleta, Calif., announced that DEC will cosell STI's Smartstar applications development and data management system for the DEC VAX. Smartstar interfaces directly with DEC's Relational Database System and will be available through DEC's Digital Classified Software program.

■

Palo Alto, Calif.-based **Hewlett-Packard Co.** and **Relational Technology, Inc.** (RTI) of Alameda, Calif., inked an agreement to provide RTI's Ingres relational data base management system for HP's Series 9000/500. In cooperation with HP, RTI will directly market Ingres for the processors.

■

Apollo Computer, Inc. and **Lucid, Inc.** announced that Chelmsford, Mass.-based Apollo will sell and support Palo Alto, Calif.-based Lucid's implementation of Common Lisp. The agreement calls for Lucid to develop an implementation of Common Lisp for Apollo's Aegis and Domain/IX operating systems.

■

Apollo Computer, Inc. also unveiled details of its licensing agreement with **Verdix Corp.**, McLean, Va., which calls for Verdix to supply versions of its Verdix Ada Development System (Vads) for Apollo's family of Domain workstations. Apollo will market and support the systems. Verdix also penned a licensing agreement with **Harris Corp.'s Computer Systems Division** that will enable Harris to develop a version of Vads for its superminis and workstations.

■

TSR, Inc. of Hauppauge, N.Y., announced that it has completed the Honeywell Corp.-to-IBM conversion of **American Express Bank Ltd.'s** international banking software system. The software, which previously ran only on Honeywell processors, automates a range of functions for international banks and similar institutions.

Users group guides changes to IBM's CICS

CHICAGO — Guide, one of the largest IBM users groups, recently responded to IBM's introduction of an enhanced version of CICS — which was upgraded, in large measure, based on Guide's recommendations — by saying the product release "demonstrates Guide's positive influence on CICS development and direction."

Guide also said the impact of CICS Version 1, Release 7 [CW Aug. 12] will aid in the continuing development of its CICS Group.

The major revisions to CICS that stemmed from requirements from Guide and Share, another IBM users group, included enhancements to the Resource Definition Online facility to allow for on-line definition of terminals; improvements in the areas of installation and maintenance of Vtam terminals; security enhancements; added command-level programming facilities; and restart and installation enhancements.

SPSS analysis software out

CHICAGO — SPSS, Inc. has announced data analysis and formatting software for IBM CMS, OS, MVS and Digital Equipment Corp. VMS installations.

SPSS Tables reportedly produces camera-ready tables with data analyzed by the vendor's SPSS-X, a statistical analysis and reporting package. SPSS Tables can handle alphanumeric data with unlimited unique values, as well as multiple response and multiple dichotomy data.

The product computes frequency counts, means, percentiles and other statistics and can produce stub and banner tables. Users can control titling, labeling, footnoting, spacing and data display, or they can use the system defaults to produce tabular reports.

Integration with SPSS-X allows users to create and modify variables; select, sample and weight cases; process subgroups; and read complex files, including column binary data. SPSS Tables users have access to 40 different statistical and plotting procedures in SPSS-X.

SPSS Tables is initially available for SPSS-X 2.1 users and additional conversions are under way. The product costs $2,000 for an annual license, with a $1,000 renewal charge.

SPSS is located at 444 N. Michigan Ave., Chicago, Ill. 60611.

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Tandem announces C, Pascal versions for Nonstop systems

CUPERTINO, Calif. — Tandem Computers, Inc. has unveiled versions of the C and Pascal programming languages for applications development on its Nonstop systems. The vendor also announced a version of Cobol 85, a proposed Ansi standard programming language that provides productivity extensions, and the Tandem Advanced Command Language, a command interpreter for Nonstop systems.

Tandem C, based on the Lattice, Inc. C compiler, has extensions that provide access to Tandem facilities and is compatible with the C compiler used for programming the Tandem Dynamite workstation and the IBM Personal Computer.

Tandem Pascal is based on the Ansi/IEEE 770 X3.97-1983 standard and Level 0 of the ISO 7185 standard. Tandem Cobol 85 supports all required modules specified in the Draft Proposed Revised Ansi Programming Language Cobol (X3.23-198X).

Both C and Pascal cost an initial $1,000, plus a monthly license fee of $225 for Nonstop II and Nonstop TXP systems, and $500 plus $115 per month for Nonstop EXT systems. Prices include runtime libraries. C will be available in the fourth quarter of 1985 and Pascal in the first quarter of 1986.

Cobol 85 costs $1,000 per Nonstop II or TXP system, with a monthly license fee of $300. The EXT costs $500 with a $150 monthly fee. The runtime library costs $500 per system for the Nonstop II and TXP and $250 for the EXT, with a monthly fee of $100 per system. First shipments of Cobol 85 will take place in the first quarter of 1986.

More information is available from Tandem at 19333 Vallco Pkwy., Cupertino, Calif. 95014.

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together is a feature that must be considered in addressing a single-vendor solution. Will the security system from a particular vendor, for example, work better and offer more ease of use if it is combined with the vendor's Dasd management system, as opposed to a similar package from another vendor?

That question can only be answered through a detailed requirements definition and analysis by the user. One would certainly expect that if a vendor's products have been designed to work together — and, it must be remembered, not all have — then there would be increased efficiency and functionality from using them together. But that is not always the case.

Service, support sensitive issue

The issue of improved service and support is a somewhat sensitive one for most software vendors. Will buying five or six products automatically entitle a user to additional consideration when a problem is discovered? Most reputable vendors claim their support is outstanding even if a user has only one product.

The capable data center manager will keep in mind that it becomes much easier to assign responsibility for a problem between two products if both are from the same vendor.

If your shop is a major customer of the vendor, it seems reasonable to assume that a higher degree of attention will be brought to bear on a significant problem. A problem is also easier to locate and fix if the same service personnel can look at both products involved.

But, it must also be remembered that software maintenance people at vendor support locations are often willing and equipped to locate problems that turn out to be with another vendor's product. The question of additional service leverage is a subjective one and is open to change as the individuals involved change.

Additional disadvantages

In addition to the cautions noted above, there are some other potential disadvantages involved in the one-vendor approach. The most serious may be that such an approach often limits a user's choices to some less-than-optimal software packages.

If you have decided on a one-vendor solution, you may be forced to settle for an inferior product for any one particular function. The overall benefits of a single vendor may outweigh this disadvantage, but it is one that must be considered carefully.

A related danger inherent in tying your data center software fortunes to a single software vendor is that you have limited your data center to just one source for new products and enhancements and for support for new hardware and operating system introductions.

Of course, you can always obtain a new package from another vendor, but then the advantages of the one-vendor approach no longer operate. The vendor selected must have a proven research and development track record and a stable financial history.

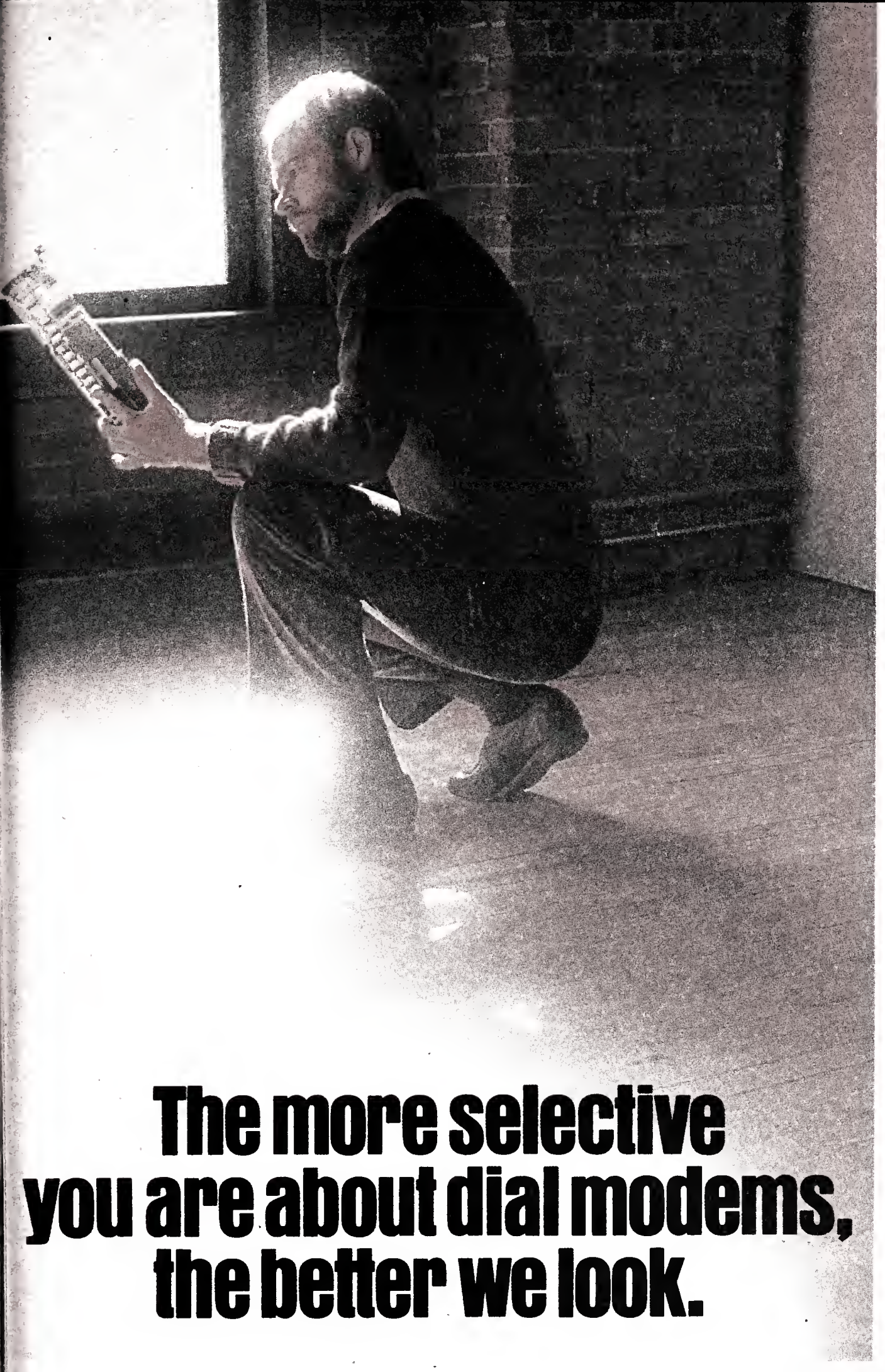
It is not the aim of this column to convince anyone that the one-vendor solution is or is not a proper strategy. With the trend toward development of integrated product portfolios will come increasing pressure on the data center manager to select a single vendor.

Instead, this column is intended to shed light on some of the trade-offs involved in the one-vendor approach. Exploration of the issues discussed here will have to go hand-in-hand with the detailed requirements and specifications analysis involved in any software purchase.

The selection of software packages can be a more critical issue since software is much more difficult to change than, for example, terminals or disk drives.

The choice of a one-vendor solution for software will make the life of a data center manager much simpler because it greatly reduces the work involved in selecting software. However, it may not be the best solution for the data center or for the organization.

Certainly, the management challenge of running a multivendor software environment is great, but there are many managers who possess the skills and business acumen necessary to accomplish the task.



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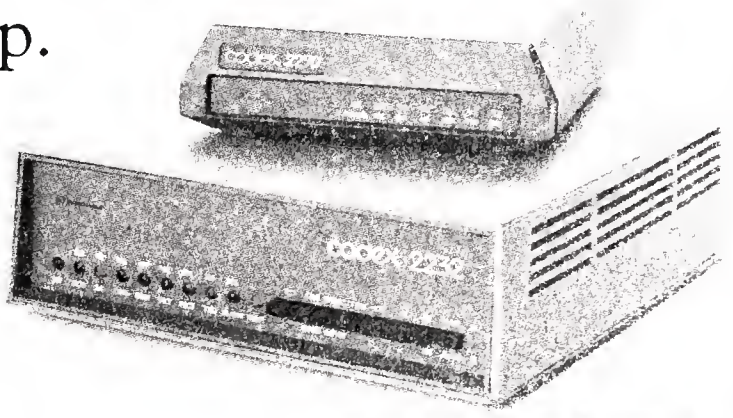

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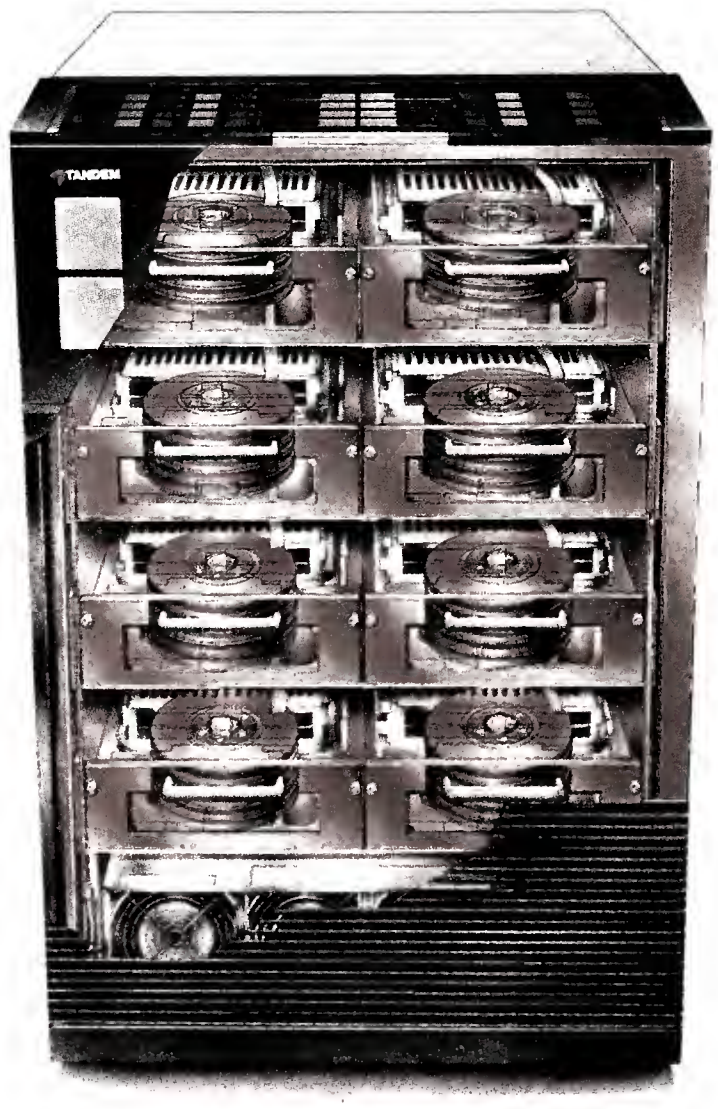

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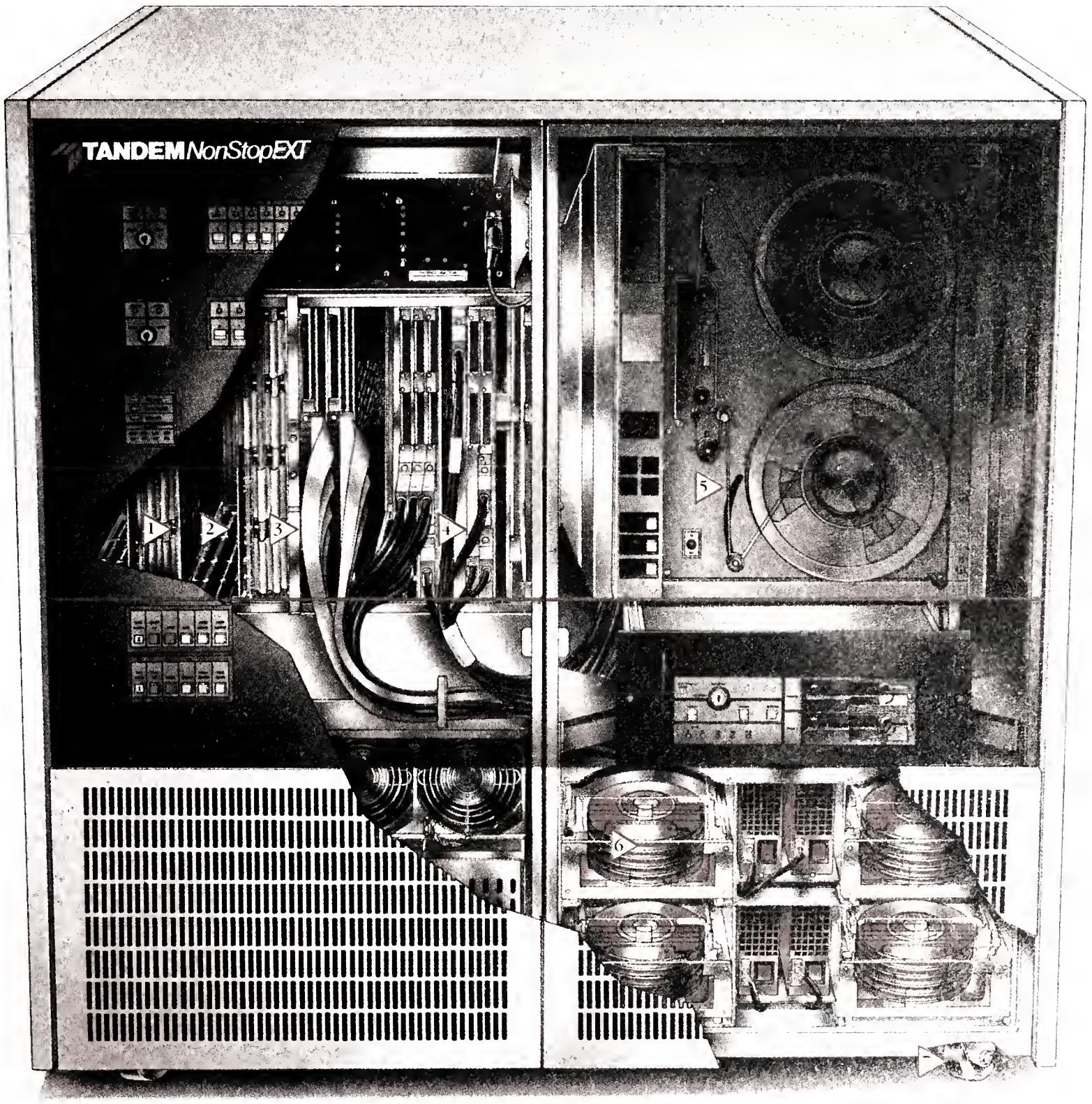

TANDEMCOMPUTERS

SOFTWARE & SERVICES

Uniras announces data link

BURLINGTON, Mass. — Uniras, Inc. has announced the Unigraph Data Link, an option for its Unigraph business graphics software.

Unigraph Data Link consists of a full screen data editor and a user-definable file reading facility that allows users to read data sets and user labels selectively in a variety of formats, according to Uniras.

The product also includes data transformation capabilities that include arithmetic data set operations to minimize external modifications of data, the vendor said.

The Unigraph Data Link runs on IBM mainframes under MVS/TSO and VM/CMS and on Digital Equipment Corp.'s VAX minicomputers under VMS and Prime Computer, Inc. and Data General Corp. systems.

It is priced from $1,500 on the IBM Personal Computer AT to $7,000 for IBM mainframes.

Uniras also announced the Unipict Interpreter, an enhancement to Version 5 of its Raspak graphics and device handling software for IBM mainframes, DEC minicomputers and Cray Research, Inc. supercomputers. The Unipict Interpreter formats graphics files for transfer between computer systems for output or further processing, the vendor said.

Raspak Version 5 is priced from $12,000 to $24,000, depending on configuration.

An interactive system for schematic specification and simulation was also introduced. The ICPC-Simulator is designed for multiuser systems in a VAX or IBM environment.

Symbolic display

Simulation results can be processed graphically or by a symbolic display of numeric results of selected connection bundles.

Graphical post processing allows users to control how results are displayed, the vendor said.

The ICPC-Simulator is priced from $5,000 on the IBM Personal Computer AT to $28,000 on the IBM 3030, 3080 and 3090 series.

More information is available from Uniras located at Suite 212, 50 Mall Road, Burlington, Mass. 01803.

SYSTEMS SOFTWARE

■ BMC Software has introduced Local Copy Plus, systems software that allows users of IBM printers and 3270 terminals to generate and send exact screen images to other users in IBM's IMS/DC network.

Local Copy Plus frees terminals immediately after initiation of print requests. Print traffic is routed through an IMS Message Queue and enables a single printer to be used for both the screen copy function and IMS-generated application output, including special forms. If a printer fails, unprinted screen messages can be stored in the IMS Message Queue until the printer is back on-line.

Local Copy Plus costs $12,950.

BMC Software, P.O. Box 2002, Sugar Land, Texas 77478.

■ Business Information Systems, Inc. has intro-

Continued on page 54

The office of the future arrives in October by mail.

Few things are changing as fast as the office work place. What with things like word processing and electronic mail and telecommunications, it's tough keeping up with what's available today. Let alone what's coming tomorrow.

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Then we'll discuss today's trends and where they seem to be taking us. Trends like top-to-bottom computer architectures. Standardized communications protocols and operating systems. Integrated software. Fiber optics. Cellular radios and phones. Just about every new twist for the office of the future.

So if you've got a product or service that belongs in the automated office, it also belongs here. The **October 16th** issue of *Computerworld Focus*. But hurry, closing is **September 6th** (materials due one week later).

For more information, contact Ed Marecki, Vice President/ Sales, *Computerworld Focus*, 375 Cochituate Rd., Framingham, MA 01701 at (617) 879-0700. Or call your local sales office.

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SOFTWARE & SERVICES

Continued from page 52

duced E1CICS, which converts Cincom Systems, Inc. Environ/1 Cobol programs to IBM CICS command-level Cobol programs under IBM's MVS, OS/VS1 and DOS operating systems.

E1CICS produces necessary CICS control blocks for conversion. The base price of E1CICS is $25,000 for DOS.

Business Information Systems, 3442 Stellhorn Road, Fort Wayne, Ind. 46815.

APPLICATION PACKAGES

■ Prime Computer, Inc. has announced enhancements to its Medusa two- and three-dimensional solid modeling software that runs on Prime's 50 series systems under the Primos operating system.

Features include a text translator, a cross-reference system and a 3-D interface to Prime's Graphics Numerical Control software. Medusa costs $20,000 for use in an office environment to $35,000 for use in a computer room environment, the vendor said.

According to Prime, a revision to the AEC architectural design module of Medusa includes additional exchange menus for layout and symbol manipulation and more symbol menus.

The Medusa AEC costs $7,000 for office systems and $10,000 for computer room environments, according to the vendor.

Prime, Prime Park, Natick, Mass. 01760.

PROFS from page 45

for Profs users. According to one user, "Profs in general eats up disk space."

New users found Profs' text entry and editing facilities difficult to learn, the respondents observed. "The Profs system evolved in a DP environment, and it is not clear that as much attention was paid to the human interface of some aspects of the system as should have been," the report stated. One user commented that, in developing the product, IBM "appeared to have no consideration for the users."

Profs originated in a program development environment as an easy way for programmers familiar with VM to send electronic messages back and forth. One user commented that a weakness of its spelling checker, included among its text creation facilities, is that a user cannot proofread a document while it is on the screen, since the user must return to a menu of editing functions.

A significant weakness of Profs is its incompatibility with IBM's Systems Network Architecture (SNA) protocols, respondents said. "This means there are formidable difficulties in making Profs fully interwork with other IBM systems and architectures," the survey stated. However, IBM stated that its goal is to provide SNA support for VM, even though IBM is positioning the Distributed Office Support System as its strategic office product, the report noted.

To support Profs, most shops required an average of 2½ people. The average organization requires one Profs support person for every 100 terminal users, according to the survey authors.

Most users surveyed indicated they would still be using Profs in five years, although more than half had plans to integrate Profs with other systems.

The survey, "Profs in Practice," can be obtained for $45 from the U.S. agent for Xephon, MJH Computer Services, 7113 Marvista Court, Orlando, Fla. 32811.

JOIN from page 45

sons, much of Release 7's enhanced functionality is contained in microcode, the "gut-level of the machine," Anderson said, according to a source who heard Anderson speak at a recent meeting of the Northeast System/38 Users Group.

Data independence

Anderson told the System/38 users that the Join function was a significant step in the direction of program data independence — the ability to hide the structure of the data base from the application program — and would have substantial impact in the System/38 community.

Here is an example of how the Join operator can be used on three files: File A lists order, customer number, item number and quantity. File B lists item number and description. File C lists customer number and name. The Join operator allows the creation of File ABC, listing customer number, name, order number, quantity, item number and description. If a value is missing, the system can be programmed to use a default value, and a file can still be created.

Although the release has impressive features, it does not appear to make the System/38 anything more than the niche machine it is now. Cullinet's president said he is not worried about the System/38 stealing away his mainframe-oriented business. Goldman observed that the System/38 uses a 40-bit address space, and its programs are written in RPG.

"It's a very nice architecture and a very good DBMS. The problem is it's not 370 architecture, and it has no tools," such as a fourth-generation language, data dictionary, query language or report writer, Goldman said.

All in all, Anderson said IBM made 216 programming enhancements in Release 7 involving the addition or change of 643,800 lines of code. That much code is likely to have an impact on users for years to come, Andersen said.

Computerworld
August 26, 1985

Software Productivity

Creating harmony in the DP shop

CW PHOTO BY O'CONNELL/LADOUCEUR

Inside:

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The keys to productive data processing: maintenance, management and development aids

SR/6
T. Capers Jones on reusable code

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Three tools for three tasks

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The 4GL debate: face-off on fourth-generation languages

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Negotiating software maintenance contracts

Special Report

Balance key to productivity

Proper mix at issue

By John Desmond
CW Staff

The secret to making the DP shop most productive, analysts and experts in the field agree, is to balance use of development aids, planning for software maintenance and managing the people involved in the entire system development life cycle.

Just how these three issues should be balanced, however, is often disputed by the experts.

Maintenance aficionado, Nickolas Zvegintzov, editor of the "Software Maintenance News" newsletter complains that vendors are too oriented toward marketing products for software development even though the vendors of maintenance tools have found the market slow going. "It is much harder to use tools than vendors would like it to be. The way to push forward in this market is for the manager to look to the vendor [that] responds to a particular problem. Most companies don't have the resources to bring in the total solution," he said.

> ❞
>
> *'Once you understand how to measure productivity, you need to identify what factors can be addressed to improve it.'*
>
> **— T. Capers Jones**
> **Software Productivity Research, Inc.**

Naomi Lee Bloom, senior principal with American Management Systems, Inc. of Arlington, Va., warns that instant productivity will be an unlikely result of bringing in a maintenance tool or a fourth-generation language by itself. "This may sound like heresy coming from a technologist, but I think the real [productivity] issue is management — people management," said Bloom. "Unless staff members are organized and are motivated properly, you do not achieve the productivity improvement factors that the glossy literature promises," said Bloom, who specializes in productivity issues and human resource management.

In Bloom's view, sorting out how to use tools and what productivity gains should be expected are the first steps to implementing tools. She warns managers, however, not to create a "Tower of Babel" effect by introducing too many tools. "A sure way to lower productivity is to expect a person to manage too many tools," Bloom said. "Instead of having 47 different tools that no one becomes expert in, hone in on a set and say, 'That's what we're going to use.' Give your people a chance to become expert, facile with the product."

Bloom also warned that managers should beware of the promise of integration. The integration buzzword is often a misnomer, in part because tools in the same family often require use of different command languages and terminology. She recommends companies pick the best report writer, the best screen painter, the best data dictionary and so on, not necessarily all from the same vendor.

Her approach to the difficult issue of productivity measurement is to compare the known time it takes to execute a specific task with the time it takes to execute the same task using a productivity tool, such as a fourth-generation language.

T. Capers Jones, an expert in evaluating what factors are known to affect development productivity, maintained that the measuring of productivity gains or losses is still the No. 1 DP issue. Jones, chairman of Software Productivity Research, Inc. of Acton, Mass., said, "Lines of code metrics always conceal real productivity. When more power languages like fourth-generation languages are used, [lines of code measurements] are almost totally worthless.

"Once you understand how to measure productivity, you need to identify what factors can be addressed to improve it. Most people think fourth-

See **QUALITY** SR/10

Tale of two DP shops

Once upon a time in the dream world of DP there were two DP managers, Perfect Perry and Failing Frank, who were at opposite ends of the scale when it came to achieving maximum productivity in their shops.

Perry used a fourth-generation language to increase each programmer's yield of source code. His programmers prepared prototypes to give end users a view of the end product before a full commitment was made to implement. Perry maintained a library of reusable code, which saved time in writing programs with similar functions.

Frank was a Cobol stalwart. His programmers wrote source code in Cobol. He used the classic system development life cycle of requirements definition, specification, design, implementation and maintenance. His programmers kept often-used blocks of code on stacks of index cards in their desks.

Perry catered to his end users, providing them with automated tools that enabled them to solve business problems. Frank required end users to submit requests for applications to the DP shop and then wait in line for their turn. His programmers produced the industry average of 10 to 20 debugged lines of Cobol per day. Frank maintained that his users always wanted more than they could get. Users waited years to get served, then asked for the sun, moon and stars when it was their turn.

In his shop, Perry focused on fundamental issues of productivity, not on the symptoms. He had a management system that tracked requests, assessed projects and reported on accomplishments. Frank kept track of projects in his head. He tried to remember the accomplishments of his staff at salary review time.

As characters, Perfect Perry and Failing Frank are extreme. In reality, most companies are not ready to implement the total solution that Perry displayed, which is usually the most expensive one. And most Cobol users, similar to Frank and despite the wishes of fourth-generation language vendors, seem unwilling to give up on the third-generation mainstay. The real secret to achieving a productive DP shop lies somewhere between these methods.

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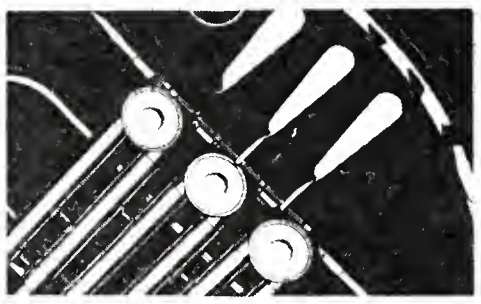

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The status of reusable code and its future in the private and public sectors rely on standard designs/**SR/6**

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MEMORANDUM

TO: Boss RG.
FROM: Ron G.
SUBJECT: Database & 4GL Research

Excellent!! Approved Sign me up too!

I have already spent many hours researching our 4GL software aquisition. Normally it would take 8 months for my department to make its recommendation. A great timesaver would be the National Database and Fourth Generation Language Symposium being held in Dallas and Boston. In 4 days we'll be able to accomplish 6 months of work.

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7. A panel discussion featuring industry experts answering questions from attendees.
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9. Guest Speaker presentations by nationally known consultants and industry leaders providing us with valuable industry insight. I know that Fran Tarkenton will be giving a lecture too!!

I strongly recommend that a corporate decision making team of Tim, Mary and Kristin go to the Symposium as well as myself. By the way – the 4th registration is free!!

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Special Report

Users find problems with fourth-generation tools

Cite programming, performance snags in complex applications

By Paul C. Tinnirello
Special to CW‡

The tide of popularity for fourth-generation languages is beginning to wash ashore the harsh realities of programming in these new language systems.

Users, especially those who are developing moderately complex production systems, are discovering some significant problems, especially with programming and performance. These problems affect both the application development and the software maintenance processes.

Programming. Many fourth-generation products cannot compete with traditional languages in solving complex application problems. One reason for this lies in the structure of fourth-generation language products; the other emanates from the products' limited range of programming features.

Many fourth-generation products are built on a multicomponent concept, which often includes a reporting tool and an executive language. The reporting tool offers simple and quick solutions to the bulk of many organizations' reporting needs. The executive language offers end users the power to solve traditional programming problems.

Both components are more or less nonprocedural. They will, in other words, allow for the construction of logic without a formal procedure. This nonprocedural environment leaves much of the control to the product and not the user.

In many programming applications, however, user control of logic — even the most subtle control — is essential. Some fourth-generation languages, for example, will not allow for the simple, byte-by-byte editing of an input field. Editing must be done through a mask procedure that may require excessive coding. The cumbersome code that the procedure creates may not be practical for larger systems.

Fourth-generation languages also fall short under another consideration, that of programming strength. Although many fourth-generation languages have eliminated much of the overhead associated with data and file manipulation, they have sacrificed programmability.

Restricted to simple applications

Third-generation languages give programmers strong assets like arrays, functions, string manipulations, looping and block structures. Many fourth-generation languages, however, do not incorporate the full range of necessary logic constructs. By leaving out these features, some vendors have restricted use of their fourth-generation language systems to applications that are simple by comparison.

A programmer who uses a fourth-generation language in production system applications often finds the lack of advanced programming logic frustrating. As a result, his code may be tricky. This has a serious impact on the future maintenance of the system.

It also raises some serious questions about the situations in which a fourth-generation system should be used as a replacement for a traditional language.

These questions may be best answered only after an organization invests in program development under a specific fourth-generation system. By then, one hopes, the organization's staff will have an understanding of the restrictions and limitations of the system.

Performance. Compounding the problem of programmability is the issue of fourth-generation performance, which can be measured in a language's affect on both human and hardware resources.

Organizations have had great success with rapid development under fourth-generation systems. In many applications, human effort has been reduced from several months to a few weeks. This is largely because of the advanced reporting language features that have been the trademark of fourth-generation languages. Integrated application environments, which guide developers through preformatted menus, have also aided programmers.

Even though human resource performance has improved, however, hardware resources have been degraded. Perhaps this is because of the overhead required to support the different automatic facilities that make fourth-generation languages so attractive. More then likely, though, hardware performance suffers because of the manner in which high-level languages execute.

Many fourth-generation systems use interpretive code rather than compiled code. This means that execution times will be relatively long. In production systems, lengthy execution time may be prohibitive.

The advantages of compiled traditional languages should come as no surprise; one need only recall the reason why Basic was infrequently used as a major production system language.

Fourth-generation languages can work in a variety of applications, but their scope is limited. Users must work to recognize what fourth-generation systems do best — then apply them to those specific uses.

Tinnirello is manager of programming for the data services department of A. M. Best Co., an insurance publishing firm based in Oldwick, N.J.

Vendors must move to allay user concerns

Traditional language programmers often criticize fourth-generation languages' programmability and performance. The typical response to such criticism (mostly from vendors) is a depiction of traditional language programmers as members of a frightened and dying breed.

This perception may be accurate, but it has little bearing on the real issue: The established programming community holds a number of legitimate concerns. Vendors have made some strides toward meeting these concerns, but they need to go a few steps further. Until vendors address all the following topics, users must proceed with caution.

Programming and performance. Many software vendors are adding or replacing the executive language component of their fourth-generation systems. The newer languages offer array processing, varied loop controls, procedural block control and compiled code. In some instances, vendors have even instituted a compiled reporting language.

The shift toward stronger and quicker executing languages may signal a vendor admission that early fourth-generation systems are not suitable for complex production applications. Not every vendor, however, has owned up to this idea.

Current and future users should be careful when they assess their programming and performance requirements. Careful preparation will prevent unnecessary coding, expenditure of valuable resources and wasted time.

Standardization. Thanks to both the narrow range of offerings and the governing efforts of national organizations, standardization of traditional languages has been rather simple. DP organizations, in fact, have come to expect the fruits of standardization: portability and interfaces.

Users are afraid to leave the safe, secure environment of the third generation. They have, with good reason, an uneasy feeling about fourth-generation languages. If vendors do not offer portability, users will fall prey to the possibility of getting stuck with a discontinued language. If vendors do not offer compatibility, users will get locked into specific vendors' environments.

The reality is that many fourth-generation languages are in serious need of better interfacing and standardization if they are to stay in use. There seems to be evidence that vendors realize this and are beginning to team up on standards.

Unfortunately, many fourth-generation products still do not provide standards. This limits the products' use in applications. Some users have had to invest heavily just to support their new language systems. Other users should take heed.

Vendor support. Poor vendor support, in terms of technical assistance and documentation, is a reality in the fourth-generation world. Although not all vendors qualify as offenders, there are some software companies that do little more than collect payment for their products.

A competitive marketplace has led vendors to add features to their products rather than stabilize current offerings. It is not unusual to find untested software in upgraded production releases; untested documentation is equally common.

Vendors seem to be moving toward better documentation, but users cannot yet assume that support for a fourth-generation system will meet the standard they have come to expect in other software.

The 4GL debate

As data processing professionals weigh the advantages and disadvantages of the new fourth-generation programming languages, one point becomes clear: The fourth-generation language market is one that is rapidly growing and still evolving.

Currently, no standard exists for these development aids, and it is not yet clear exactly what their impact will be in traditional data processing environments that use third-generation languages.

The *Computerworld* fourth-generation language debate presents two opposing views of these languages. The debate, highlighted below, begins on SR/22.

”

'Automated fourth-generation languages have progressed to the point that they can be used to replace Cobol and Fortran for all but the most complex or time-critical applications.'

— Pieter Mimno
See SR/22

”

'Fourth-generation language vendors will survive by moving away from inventing languages and toward supplying support functions that are compatible with existing languages.'

— Nicholas Zvegintzov and Ray Bengen
See SR/23

Special Report

Cobol remains a mainstay as new languages spread

By Arnold Leak
Special to CW‡

Amid the echoing proclamations of fourth-generation language enthusiasts insisting that Cobol is dead, companies using the venerable language may get the feeling that they're driving Studebaker Larks while surrounded by new sports cars.

With the advent of fourth-generation languages and the associated marketing hype, MIS managers face a dilemma. The urge to use state-of-the-art techniques often conflicts with business realities.

For example, is it feasible for a Cobol shop to adopt a fourth-generation language? Can an MIS manager afford to retrain the data processing staff in the new language? What about converting existing Cobol systems? What about maintenance — can fourth-generation languages be adjusted as easily as Cobol? Must Cobol be abandoned to take advantage of fourth-generation techniques?

After all, Cobol has been around for more than 25 years. It is the most widely used procedural language in the world and is recognized by the American Standards Institute. It provides readability, machine independence and a common base of communications via groups like Codasyl.

In addition, Cobol-literate personnel are easily found, and properly written Cobol code is easier to maintain than most of the cryptic proprietary fourth-generation languages.

Good reason for hoopla

This is not to say, however, that shops using Cobol should become complacent. There is good reason for all of the fourth-generation language hoopla. Until recently, programming methods have barely changed, while hardware has improved drastically. Although computer hardware costs have dropped, the application development effort is still as labor intensive as ever. Thus, software development costs continue to rise.

Even though DP departments are hard at work producing applications to make the rest of the organization more productive, the computer's power has not been fully harnessed to enhance the development and maintenance of those applications.

With the need for efficient applications growing at better than 45% annually, coupled with existing backlogs, MIS managers are behind the eight ball trying to improve programming productivity in terms of both quantity and quality.

Considering the tedium and labor intensity of hand coding, testing, debugging, maintaining and upgrading applications, it is inevitable that, using traditional application development methods, the application backlog will increase rather than decrease. And, to compound this problem, each year a larger piece of the MIS budget is absorbed maintaining existing applications rather than focusing programmers' talents on the production of new applications.

Applications development productivity must increase exponentially to establish and maintain a workable programming environment. Therefore, it is logical that productivity tools are gaining widespread acceptance among those who realize the critical importance of application development productivity.

To reduce realistically the application backlogs and offset expected programmer shortages, hand-coded Cobol must be minimized.

There is no justification, in general, for retaining this labor-intensive method of application creation in a marketplace flooded with high-powered productivity tools. There is, however, reason for MIS managers to be reluctant to change over to fourth-generation language application development from Cobol.

What MIS managers should be looking for are products that support their current operations while taking advantage of new technology.

Although current publicity implies that fourth-generation languages are required to be progressive, what is important are the techniques behind fourth-generation languages. It is not necessary that fourth-generation languages be used but that the gains promised by these methods be applied to the creation of applications.

In the case of Cobol shops, an application development system using fourth-generation language techniques can produce Cobol code at rates that rival many of the fourth-generation languages available.

MIS management can take advantage of productivity tools that use fourth-generation approaches to gain the most from fourth-generation languages. This can be done by understanding what these languages are all about (see story SR/30) and by shopping for tools that provide a compromise between fourth-generation languages and realistic constraints such as Cobol. What MIS managers have is a practical choice, not an either-or situation.

Leak is vice-president of technology for Commercial Systems Laboratories, Inc. in Auburn, Ala., the producers of C/Script II, a fourth-generation Cobol application development system.

Special Report

Reusable code paying off in variety of applications

Effective in systems doing similar tasks

By T. Capers Jones
Special to CW‡

For really large systems — those with more than 100,000 source statements — third-generation languages hold all the world records in productivity.

In this top class, moreover, every record holder depends on a variation of one particular technology — the construction of programs and systems from standard, reusable modules and the reliance on standard, reusable designs.

Not every system, or even every industry, can make use of this technology at the present time.

Reusability has been most successful for programs and systems that have similar or identical processing and data requirements, in fields such as banking and insurance, where even competitive companies perform more or less the same kind of processing.

In government and industry

The following is a brief survey of the current status and future prognosis for reusability in selected industrial and government sectors:

Aerospace. The space shuttle — not its software but the aircraft itself — is the most prominent aerospace example of reusability. The National Aeronautics and Space Administration, however, is also making effective use of reusable software. A recent study that Nasa commissioned cited more than 60% reusability among sampled applications in several operating groups.

In the civilian aerospace sector, airline reservation systems are a classic example of the kinds of systems that are natural for reusability. These systems require high transaction volumes and are found in an industry where one finds essentially identical processing requirements among direct competitors.

On the whole, aerospace has an effective history of reusability and a good prognosis for the future.

Banking. Many banking and financial applications are essentially identical, even among competitive enterprises. This phenomenon has been demonstrated in New Zealand, where banks use standard software under government control.

Large banks — those with more than 500 programmers and analysts — typically develop standard reusable code and designs for their own use. Small- and medium-size banks, which employ fewer software professionals, are able to buy standard banking packages in modular, reusable form; they then add minor additional features as needed.

Banking is one of the primary domains where reusable designs and reusable code have been valuable, and this should remain so in the future.

Department of Defense. As the world's largest user of computers and software, the DOD might be expected to have established itself as the world's leader in software innovation and effectiveness as well. This, unfortunately, is not the case.

Unlike the Japanese Ministry of International Trade and Industry, which is playing a dynamic part in both computing and software, the DOD is relatively inert in leading-edge issues.

While the Ada language and its supporting environment are mildly innovative and can eventually give some support for reusability, the fact remains that the DOD has no serious program in place to create, stock or supply standard reusable designs or reusable code to the defense community.

The prognosis for the department is ambiguous: It may yet become a world leader in reusability, but it must first recognize the need to move in that direction.

Federal government. With an ever-growing bureaucracy and ever-mounting expenses, the civilian agencies of the federal government could find substantial economies in lateral coordination, use of reusable designs and use of standard reusable

See **REUSE** SR/7

Jones is chairman of Software Productivity Research, Inc., a consulting and expert systems development firm based in Acton, Mass.

REUSE from SR/6

code from agency to agency.

This fact is certainly known by the General Accounting Office and the General Services Administration. Both agencies have had partial and intermittent successes in their efforts to introduce standardization and shared technologies across various federal agencies. As those who have worked within the federal government recognize, however, it is not easy to achieve lateral coordination across such a vast and essentially feudal type of enterprise.

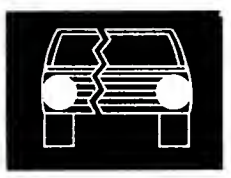
The prognosis for the federal civilian government is not overly favorable: Reusability is recognized as desirable, but the mechanisms for actually putting it into practice are probably insufficient.

Health care. The 1984 rate of increase in hospitalization costs was only 4.5%, compared with 10.2% in 1983. A major factor in the reduction was increasing recognition by health care professionals that shared technologies and reusability are highly effective.

More than 75% of American hospitals currently participate in various technology sharing programs. Blood banks, laboratories, nuclear medical facilities and data processing shops are examples.

The general prognosis for reusability in the health care industry is quite good: A long history of technological sharing and the need to lower costs are making the use of common designs and reusable code very active concerns for professionals in the health domain.

Insurance. The insurance industry has been one of the leading users of computers and software since these first became available. Today, large insurance companies are among the most software-intensive enterprises in the world. Programming staffs of between 1,000 and 3,000 professionals are not uncommon.



Standard reusable designs and reusable code are perhaps further along in the insurance industry than in any other.

The prognosis for reusability within individual insurance companies is not at the same level. Overall, however, insurance reuse is quite respectable.

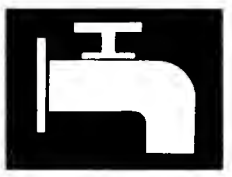
Municipal governments. All municipal governments share a good number of similar data processing problems — for example, how to process taxation, land zoning, building permits, police business and school records.

Theoretically, then, standard municipal software designs and libraries of reusable code should be quite effective.

Sometimes they are, such as in the area of shared data processing services among police agencies. But governments, by nature, tend to be parochial, which somewhat lowers their abilities to cooperate laterally and share software.

The overall prognosis for reusability within municipal governments is ambiguous but positive: In the long run, we are likely to see as much as 40% commonality in basic applications.

Public utilities. The ever-increasing spiral of rates for natural gas, electricity, water and telephone services highlights an important point — public utilities need to do all they can to lower their costs.



Because the public utility sector deals with common application types, its member utility companies should be able to share common designs and common code with each other, yet they have not done so as fully as they might.

The utility companies in the past — under full regulation — were not always particularly innovative or cost conscious.

Recent trends toward deregulation and the introduction of cost consciousness within the segment, however, have made exploratory use of standard software a significant topic.

The overall prognosis for reusability within the public utility sector is quite favorable: The climate is right, and the companies have strong motivation.

State governments. State governments share many common problems, require substantial DP and computing support and are relatively sensitive to voter feelings. These three factors may catapult U.S. states governments ahead of the U.S. federal government.

Already, state governments have an effective common data base of drivers license and motor vehicle information. With the success of such data bases in mind, larger efforts to hold data in common may occur.

The overall prognosis for reusability at the state government level is fairly good: The early steps have been visibly useful and may serve as models for more extensive reuse.

Special Report

Rapid prototyping matches system to user needs

By Linda Brice
Special to CW‡

Rapid prototyping has yet to transform software development, as its staunch supporters expected, or to prove itself a disaster, as its strong detractors predicted.

The technique simply has not been around long enough for all of its strengths and weaknesses to have evolved. No one has the time and money to conduct a controlled study where a large system is developed in duplicate — once with prototyping, once with traditional methods — holding all human and machine conditions constant to weigh the two approaches against each other.

Rapid prototyping has, however, already emerged as a solid technique to improve one aspect of productivity: that of delivering the right system for a user's present environment, a system that will evolve as the user's needs change.

Under this technique, developers bring up a physical representation of key parts of a system before the system gets implemented. Users then have the option of canceling their development requests, looking to packaged software for a better solution or allowing the DP department to continue its work.

If the users cancel their requests or seek packaged software, the DP backlog shrinks, and it shrinks more quickly than it would if users had to wait for lengthy specifications to be written and approved. The discarded prototype does not represent wasted effort. Rather, DP will have wasted less effort on the rapid prototype than it would have on a full system that worked but did not meet users' needs.

If the users like the model and decide to continue with development, the prototype improves programming productivity.

Prototyping saves the DP department time because communications between users and software developers are stronger than they would have been had the developers used traditional paper models.

In some cases, the prototype can even evolve into a final production system. Rarely, and in only the most simple of systems, however, can a prototype become an implemented system.

Because prototyping can help users quickly define their needs and because it can shorten the tuning phase of system development and reduce enhancements, the technique can reduce DP applications backlogs and help users decide not only what they want but also what they need and what they can afford. To bring on these benefits, however, prototyping must be done correctly and with the proper tools.

Methodology. Under most circumstances, a prototyping methodology should include most or all of the following phases:

- Planning — in which developers and users lay out rough, flexible schedules.
- Rapid analysis — in which developers draw up a very brief, high-level paper model, usually using a visual aid such as a data flow diagram.
- First-cut prototyping — in which developers produce a working model.
- Prototype iteration — in which developers seek users' suggestions and incorporate them into the working model until the users accept the model.
- Benchmarking — in which developers test performance to determine how the sytstem will respond in production.
- Training — in which the developers teach the organization's software maintenance staff any prototyping methods and tools that have been retained in the implemented system.

Tools. In his book, *Applications Prototyping: A Requirements Definition Strategy for the '80s* (John Wiley & Sons, Inc., 1984), Bernard H. Boar suggests that DP would benefit from having a prototyping center, a tool kit that contains a number of productivity aids. Following are the tools he indicates a prototyping center should include:

- A text editor.
- A data base manager.
- A procedural language/program generator.
- A teleprocessing monitor.
- A screen generator.
- Dictionary maintenance tools.
- A nonprocedural report writer.
- An interactive query language.
- A documentation reporter.

A number of data base management systems on the market feature all or most of these components in one package. Because it is important to be able to modify data storage structures quickly and easily during rapid prototyping, users will benefit most from a DBMS with a relational structure.

Brice is a staff member in the administrative data processing division at Los Alamos National Laboratory in Los Alamos, N.M. She is cowriting a book, The Professional User's Guide to Buying Software, *with John Connell, a computer systems engineer at Martin Marietta Corp. Denver Aerospace. Van Nostrand Reinhold Co. expects to publish the book in September 1986.*

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Special Report

QUALITY from SR/2

generation languages will be sufficient, when in reality, they are not and probably never will be," Jones said. The largest programs ever developed in a fourth-generation language are relatively small, the equivalent of approximately 50,000 lines of Cobol.

"You can't do big systems in fourth-generation languages because of the performance penalty you have to pay," Jones asserted. "The rule of thumb is that it takes five or six times as much machine time to run an application written in a fourth-generation language."

The first step toward improving productivity is to understand how much is being spent on software or the total cost of developing and running a package. "The biggest expense element over the life of the package is getting rid of bugs. One of the most effective ways to cut costs is to minimize defects.

'Aim for quality'

"Aim for quality, and productivity is a natural by-product," he said. "If you forget quality, it's technically impossible to make really substantial productivity gains."

Capers agreed that management is crucial to better development productivity.

A skeptical outlook on the productivity improvement promise of fourth-generation languages is that of Tom O'Flaherty, principal of Information Service Strategies of Woodridge, N.J. Allowing end users to use complex systems is a primary way to improve productivity, but "really critical end users don't have time to learn computer languages," O'Flaherty said.

O'Flaherty disputes estimates that fourth-generation languages improve development productivity by a factor of nine or 10. Actual coding is 10% to 20% of the cost of a development project. If development is one-third of lifetime software costs, that is a 3% to 6% savings over the entire life cycle, he said.

Companies can improve productivity by being heartless with end users, O'Flaherty suggested. "You can be productive, or you can do what the end users want," he said.

"Managers have to tell the end users they will be heard but will not be central [to decision making]. Otherwise, DP will not be efficient."

Development tools market on the rise

The market for development aids such as fourth-generation languages, which are seen alternately as a replacement for Cobol or as merely a productive way for end users to request corporate data, is a growing one.

International Data Corp. (IDC), a Framingham, Mass., market research firm, is projecting the market for fourth-generation languages based on data base management systems to grow an average of 40% each year until 1989.

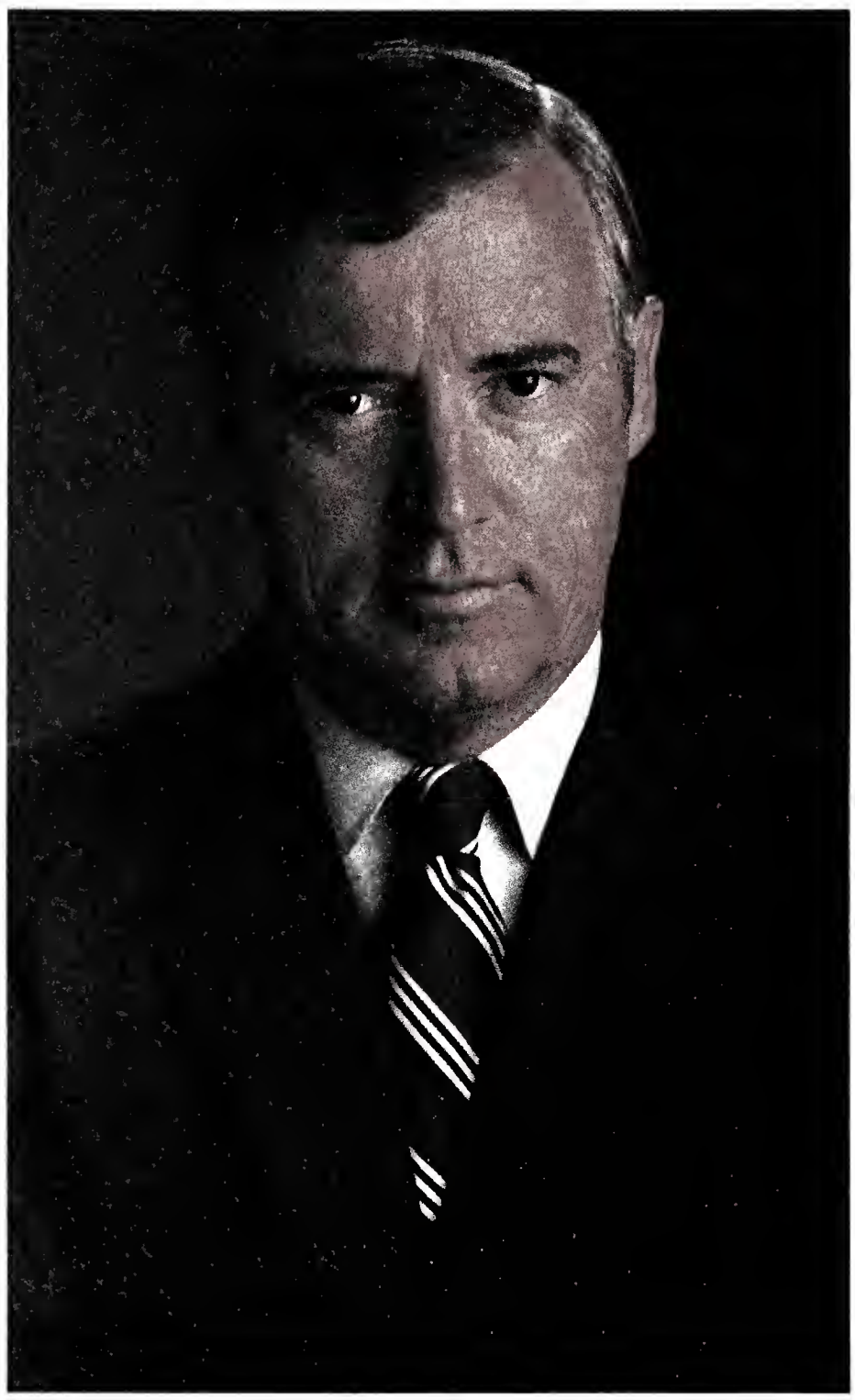
IDC estimated the total market for fourth-generation languages, including those for personal computer, mid-range and large systems, is $265 million this year. IDC projects an increase to $993 million by 1989.

The maintenance tools market is a harder one to quantify, according to the guru of the maintenance market, Nicholas Zvegintzov, editor of the "Software Maintenance News" newsletter.

No good figures exist on the sales of maintenance tools, according to Zvegintzov. He has approximately 15 advertisers in his newsletter marketing maintenance tools for Cobol — products such as a source code file compare. No maintenance tools exist yet for fourth-generation languages, but some will eventually be needed, he noted.

The time has come for straight talk about database management systems.

"The only reason to buy a database management system is to build better applications."



Throughout the history of the software industry, proponents of one database architecture after another have promoted their respective systems as the sole solution to a company's application backlog problem.

The early debate centered on hierarchical versus network architecture. Advocates of inverted file entered the argument in the 70's. And today, relational is the architecture of choice.

While this discussion about architecture is interesting, it's just not the issue.

Database management systems, beginning with the very first, were created to do one thing and one thing only—they were created to build better applications. *Building applications—efficient, online applications, faster, with fewer people—is the only real issue.*

Today corporations have a huge backlog to contend with. And the applications they need to develop have different characteristics. Some may be retrieval only. Some may be heavy on update. Some will run the company, and will require professional development. Some can be created by end users to satisfy their own needs.

It is extremely important to have a database management system that can handle all applications. *It is essential* that a database include tools rich and comprehensive enough to accommodate both the professional developer and the end user. It's the richness and power of these tools that's critical to the successful implementation of highly responsive fourth generation applications. What's demanded, in fact, is software that goes a *step beyond* today's conventional relational database systems.

With a comprehensive database management system and the appropriate tools like the kind I'm talking about, you'll make the data processing department a *strategic asset* instead of corporate overhead. You will make your company succeed in a highly competitive world.

In Cullinet's new Annual Report, Presidents and CEO's of major corporations speak about the positive impact Cullinet has had on their operations. For a copy that you might like to read and pass along to your company president, write to me. I'll see that you get one.

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Chairman of the Board

The only database management system worth buying is one that meets these six requirements.

Stated simply, IDMS/R is a step beyond today's conventional relational DBMS because it meets these key requirements for building successful applications.

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The application development system required to build high performance production applications requires more than a fourth generation language. Cullinet's ADS/OnLine is a comprehensive application development environment for the MIS professional combining fourth generation language with a menu-driven modular development approach. Integrated with the data dictionary, this minimizes not just the programming but the entire design, development and documentation of an application. Furthermore, this approach produces a dramatic reduction in maintenance and support.

2. End-User Application Development Facilities

Because Cullinet recognizes the difference between production and end-user applications, as well as the need for both to share common data, we provide an easy to use end-user oriented development and inquiry system. The Automatic System Facility of IDMS/R is a non-procedural, menu-driven tool designed for end-users. Once data tables are defined, an application is automatically generated. The query facility of IDMS/R provides menu-driven query capability and full online help, so end-users can build working applications in minutes and get reports easily and efficiently.

3. Relational Architecture

IDMS/R allows for the definition of databases using the relational data model. Data tables and associated user views are easily defined online. Additionally, any number of key fields may be defined. IDMS/R also supports advanced relational features including referential integrity and domain definition. This architecture provides the capability to address all application requirements.

4. High Performance Database and Application Tuning Facilities

IDMS/R is a full multi-tasking, multi-threaded system providing for concurrent processing of on-line and batch, update and retrieval applications. Additionally, tuning facilities provide efficient indexing techniques, space management, page management, and buffer management. No conventional relational DBMS has these capabilities.

5. Dictionary Driven DBMS

Data integrity and data independence are essential in a DBMS environment. The dictionary actively controls the source and use of all data. Data definitions, data validation criteria, data formats and security are all defined within the dictionary and exist only once, eliminating redundancy and ensuring integrity. This information is then automatically used throughout the system. Examples of the functionality of this facility include never needing to define output formats for query; never needing to define field attributes for screens; never needing to code validation and editing criteria when using ADS/OnLine. Only IDMS/R provides this level of dictionary integration.

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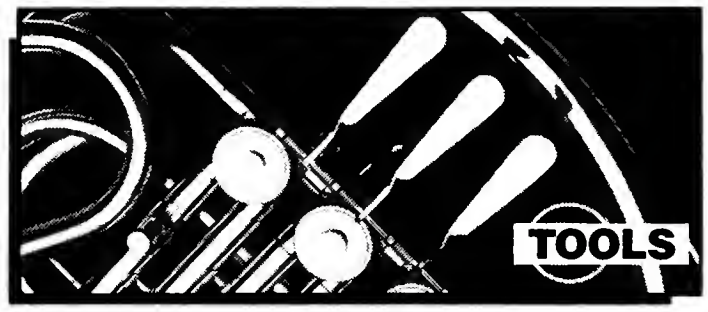
Special Report

Software tools improve firms' performance, conserve time



USER REPORT

COMMERCIAL UNION INSURANCE CO.

Problem:
Too many runtime abends.

Solution:
Tool that identifies JCL errors.

Benefits:
Decrease in demand on CPU and personnel.

BOSTON — The operations support staff at an insurance firm here cut its number of runtime abends in half and saved related CPU and staff time after it installed a software utility that flags errors in job control language (JCL) modifications.

Commercial Union, a worldwide property, casualty and life insurance company, once logged approximately 35 abends in the more than 300 production jobs it ran each night, according to Ed Swartz, manager of operations support services for the firm. Since the firm installed the software tool, he said, about 17 jobs have abended each night.

Because fewer jobs need to be rerun, the firm has decreased demands both on its mainframe hosts, a 24M-byte IBM 3081 and a 16M-byte 3083, and on its operations staff. "In the past, we had people in production who did nothing but fix abends," Swartz said. Commercial Union dedicated one operations staff member on each of four shifts to that job. Since the firm installed the utility, every staff member has been able to perform a number of duties.

Commercial Union installed the tool, Triangle Software Co.'s JCLcheck, in March 1982, as part of an effort to manage production. "We needed to integrate or centralize all our job documentation and get control of our entire operations," Swartz said.

Since then, the firm has used the product in a number of projects, including a large storage conversion Commercial Union completed in February. For this project, Swartz's staff had to migrate thousands of data sets from mass storage to disk and tape.

The job entailed making modifications to block sizes, finding locations where data sets were used and determining whether data migrations were valid. In an effort to keep track of the JCL changes and make sure they did what they were designed to do, Swartz's staff invoked JCLcheck both before and after it ran JCL modifications.

Before a job ran, the software flagged errors in proposed JCL modifications; afterward, it validated all changes (it checked, for example, to see that data sets indicated in JCL statements actually existed).

The software tool ran under MVS/XA on both the firm's mainframes. To start the tool's error-checking process, staff members ran JCLcheck and JCL modifications against each other in batch mode. Whenever the utility detected an error, it notified the users on-line. As output, JCLcheck printed all faulty JCL statements along with a description of the problems in those statements. Users then corrected the errors, ran the modifications against JCLcheck again and repeated the process until no errors surfaced.

With the help of the utility, Swartz's staff completed the conversion less than one month after the firm layed out detailed plans for the job. He estimated that the project would have required approximately six months if programmers had to do manual reviews of each JCL modification and validate its relation to other changes. "With the JCLcheck product's cross-referencing capabilities, we have absolute confidence in making across-the-board changes," Swartz said.

Commercial Union's staff uses the utility to clear every change they make to their system's JCL. This is especially important to the firm, Swartz said, because its DP shop is in a constant state of flux and needs to keep abreast of all JCL modifications.

"Our shop has been involved in upgrading one of our mainframes, getting rid of a mass storage unit, adding new software [and] undergoing a disk conversion, pretty much simultaneously," he said. "With the JCLcheck utility, necessary changes in JCL can be made swiftly and efficiently."

The utility has eliminated visual reviews of JCL modifications at Commercial Union, allowing analysts to spend time on less tedious tasks, according to Swartz.

USER REPORT

MANUFACTURERS HANOVER TRUST CO.

Problem:
Applications testing forces staff to work overtime.

Solution:
Automated testing tool.

Benefits:
Workers have weekends off; backlog gets cut.

NEW YORK — A financial firm here reduced the number of weekend hours its employees had to work and increased the number of days its DP staff could devote to CICS applications testing after it installed a tool that automated the testing procedure.

Until this spring, Manufacturers Hanover Trust Co. did most of its testing on weekends, according to Kenneth A. Hamilton, senior vice-president of global wholesale systems. The firm's interactive transaction processing applications — funds transfer, letters of credit and the like — had been integrated around IBM's IMS on a 32M-byte IBM 3081 and were too complex to test during normal working hours.

"Because of the interactive nature of our systems, we could not bring up a complete production parallel system in the 9-to-5 environment," Hamilton said. "So, we typically came in on weekends."

The schedule had the following two drawbacks:

- Because changes to one module affected others, employees from many different departments had to participate in the tests. On any given weekend, clerks and managers from different user departments had to join data center staff members and applications programmers in the shop.
- Because every year had a finite number of weekends, the DP shop developed backlogs and delays. Manufacturers Hanover had only 52 weekends in which to test between 18,000 and 20,000 annual changes and additions to program modules.

The testing procedure relied heavily on manual labor. After programmers added or changed a module, employees from the firm's user departments ran tests of related modules that the change would affect. The users then checked output from the original system against output from the changed system to make sure the results matched.

User acceptance and environmental testing for a major change (a product offering, for example) often required between 10 and 13 weekends of work, Hamilton said. Manufacturers Hanover installed the automated testing tool, On-Line Software International, Inc.'s Verify, to streamline the process and speed up system delivery.

To test a modification, a programmer now calls on the tool to run regression analyses of system output. The tests compare results obtained from the original system against results from the modified system, and the tool generates output that flags any discrepancies. Because the tool checks for errors systemwide, employees do not have to initiate and run a test over and over, once for each of an application's modules.

After system operators at Manufacturers Hanover became familiar with the tool, they could run an automatic test stream in about one-tenth of the time they had needed for manual transaction entry, according to Hamilton.

"What Verify does for us is to collapse the time necessary to introduce changes to our systems," he said. "It allows us to test new systems and enhancements automatically during the normal workday and reduces the need to bring people in on the weekends." The firm still tests some of its new systems on weekends, but fewer people have to show up for the trials.

Because the firm has only used the tool for a few months, Hamilton said he is cautious about predicting its impact. He estimated, however, that Verify will cut applications testing time in half for most applications and will pay for itself in less than one year.

USER REPORT

LIBERTY MUTUAL INSURANCE CO.

Problem:
Spaghetti code imposes maintenance problems.

Solution:
Tool for structuring Cobol code.

Benefits:
More free time for development.

PORTSMOUTH, N.H. — A conversion program that imposes structure on spaghetti code has given an insurance company's DP shop here a firm grip on maintenance and a chance to extend the lifespans of some old but good programs.

The DP staff of Liberty Mutual Insurance Co., headquartered in Boston, installed the software in 1984 to solve some problems associated with a group of unstructured Cobol applications.

The firm had instituted a structured methodology and had brought most of its programs into line. Some of its central operations, however, still depended on unstructured applications — programs that performed well despite their unwieldy designs.

"We had identified about 50 real spaghetti programs," systems manager Paul Mooney said. "They ran well in production, but when we had to change them, we had problems."

Mooney said the programs, some written as long ago as 20 years, confused new programmers who had to maintain them. The problem was especially pronounced because Liberty Mutual had lost programmer continuity when it moved its DP operations here from Boston in 1980. Most of the people who had to maintain the firm's code had not

See **LIBERTY** SR/49

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Special Report

Well-honed management techniques will give boost

Tools, gadgets help, but are not enough

By William W. Marks
and William D. Strowbridge
Special to CW‡

Technical solutions to productivity problems address symptoms, not fundamental issues. To improve productivity, MIS managers must employ well-defined systems of management.

Increasing productivity does not depend on tools or gadgets — it's not that easy. True productivity gains come from identifying and developing systems that are critical to a company's business and ensuring that staff activities are directed to this end.

Technical solutions to productivity problems address symptoms, not fundamental issues. The thrust of most productivity tools, for example, is to produce operational code faster, but only a modest portion of systems development is devoted to producing programs.

To improve productivity, MIS managers must employ well-defined systems of management that allow them to direct and control MIS resources.

Once an organization has a system in place, it can bring in productivity tools and do some fine-tuning. Tools are valuable for speeding up the development process, but speed is an asset only if one is headed in the right direction.

A good system of management will let the MIS manager do the following:

- Track requests for services.
- Classify projects.
- Oversee project approval.
- Organize the MIS staff to complete assigned work.
- Report on accomplishments.

Tracking requests. Many organizations allow informal work to filter into MIS, and this is unacceptable. A systems and programming department is like a machine job shop: Both manufacture one-of-a-kind products.

The manager of a well-run machine shop always knows what jobs are to be done and when. An MIS organization requires the same discipline. To gain this control, MIS must have a formal project request procedure.

Classifying projects. Classification establishes a structure that is consistent with resource commitment. Once the structure is in place, it directs how project approval and reporting will proceed.

A structure that works particularly well is one that classifies projects as either discretionary or nondiscretionary.

Nondiscretionary projects are those in which staff members support production systems by solving operational problems or making minor improvements; these activities are part of the cost of having systems. All other projects are discretionary.

Duration is a handy guideline for

Marks is president of Poc-It Management Services, Inc., a Santa Monica, Calif.-based management consulting firm that specializes in information services. Strowbridge is vice-president of MIS for Dataproducts Corp., a printer manufacturer based in Woodland Hills, Calif.

to data processing center productivity

classifying projects. With few exceptions, any project that consumes more than one staff-month of effort is discretionary. MIS managers can benefit further by classifying discretionary projects as either major — requiring more than one staff-year — or intermediate — requiring between one and 12 staff-months — and approaching the two somewhat differently.

In medium-size and large organizations, MIS staffs tend to be more productive if they are divided into two groups: one that handles discretionary projects (software development, for the most part) and another that takes responsibility for nondiscretionary projects (mainly maintenance work).

Managers who so divide their staffs, however, must take special precautions to make work satisfying for maintenance workers who are assigned to nondiscretionary projects (see story SR/45).

Overseeing project approval. Projects must be approved at the proper level:

■ Because nondiscretionary projects usually cost between $5,000 and $6,000 apiece, the approval level for them need not be high.

■ Discretionary projects, both intermediate and major, require approval by users' high-level managers. Intermediate projects generally require the approval of decision-level managers from the users who request the service.

Major projects typically should get approval from an executive committee that includes senior managers from each of a company's user departments. The approval of both major and intermediate discretionary projects should be based on documentation similar to that used for capital appropriation requests.

A good approach is to have users and representatives from MIS prepare a formal document that includes a statement of need, alternatives considered, cost, benefits and recommended approach. The appropriate management group can then use the document to decide whether or not to proceed with the project.

Project approvals are financial decisions, requiring a commitment of resources, and users should be charged for the projects they request. Chargeback focuses management attention on the business value of each request.

Organizing to complete work. Once a project gets the go-ahead, MIS must develop a plan that describes what will be done, who will do it and when it will be completed. The MIS department will also need a tracking process to monitor its progress against the plan. Without formal schedules and tracking, a manager cannot measure performance or determine how productive the staff is.

A formal systems development methodology is important for large systems development. The methodology need not be complex or procedural. It must, however, define project phases and deliverables in enough detail that management and the project team can communicate clearly about activities and status.

Reporting accomplishments. MIS managers should require weekly project reports from their staff members that account for staff time, show progress toward goals and highlight events that are overdue. In addition, MIS managers should provide to the company's executive managers comprehensive monthly documents that report on MIS activities.

To exercise control over MIS project work — the most vital part of a program to improve productivity — executive managers need information about service delivery, resource commitments and progress. MIS should provide monthly reports on all projects; the type of report, however, will depend on a given project's size:

■ For nondiscretionary projects, reporting should focus on the quantity of work and on service delivery. MIS should give executive management statistical reports that show the number of requests received, completed and backlogged; the average duration of projects; and the percentage of jobs completed on schedule.

■ For intermediate systems development, MIS should provide executive management with a monthly report that shows a one- or two-line summary of each project. Intermediate projects are large enough to warrant individual scrutiny, but they require little more than a report of progress and cost against plan.

■ For major projects, monthly reporting should be more detailed, as these projects tend to have the most problems.

A desirable way to tackle large projects is to break them down into phases and report on that basis. If project plans are well structured and task assignments are measurable, MIS management can maintain control and keep users abreast of progress.

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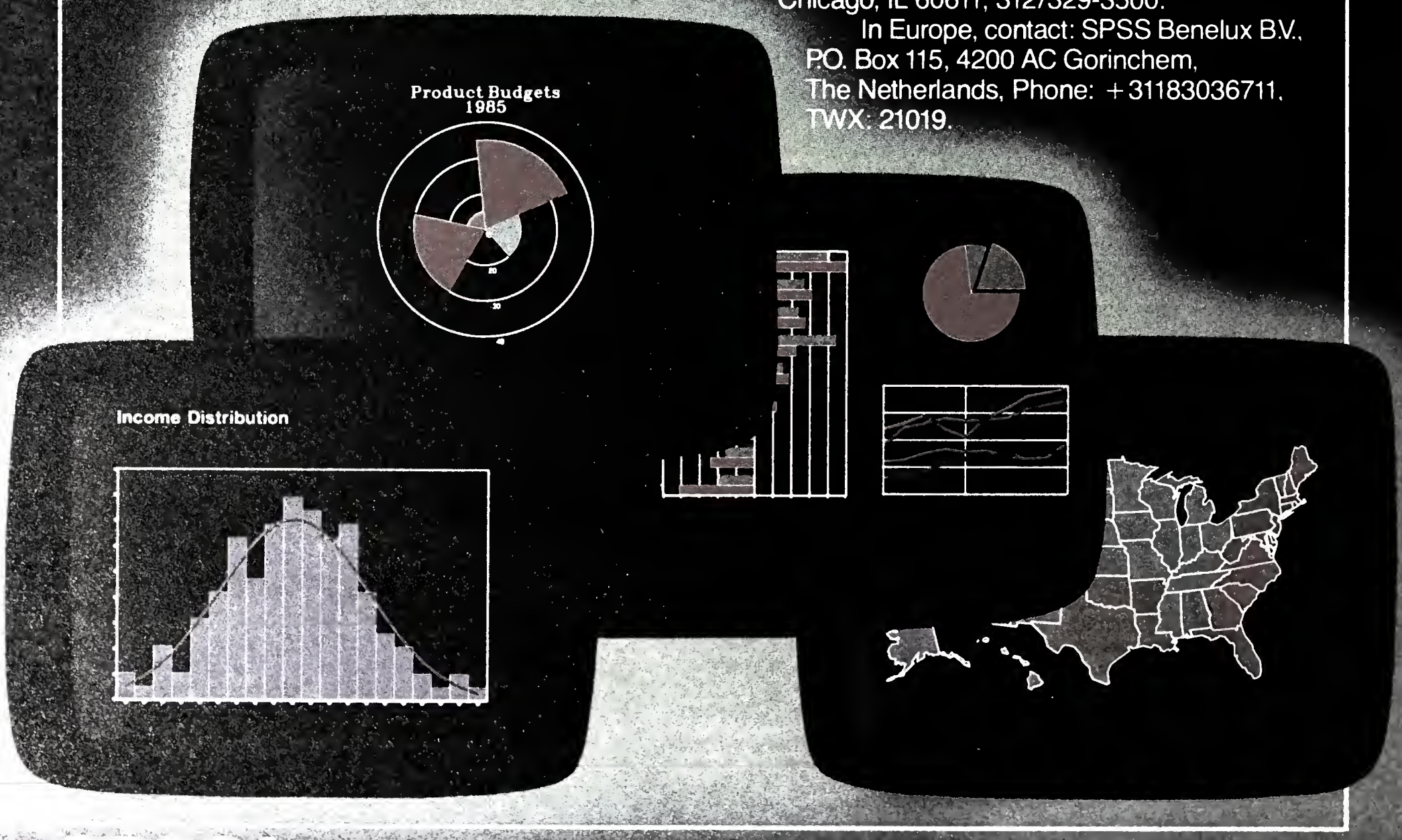

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Special Report

Manager's role critical to keeping staff productive

By James Huling
Special to CW‡

After a recent study by the Public Agenda Foundation of New York, researchers Daniel Yankelovich and John Immerwahr reported that only 23% of American workers were working as hard as they could. The reason, they said, was ineffective management.

MIS managers may argue over the exact percentage of unproductive workers in their industry. They will agree, however, both on the presence of untapped potential and on the premise that management is the greatest single influence on employees' ability to reach their potential.

True gains in productivity can only be accomplished when managers motivate individuals to reach their potential. To motivate a professional staff, MIS managers must recognize — and develop in themselves — those qualities that characterize the truly effective manager. The following are among the most important:

Demandingness and ability to praise. Managers' expectations strongly influence employees' work. If a manager expects less-than-average performance from a particular employee, that employee's productivity will be poor; if the manager's expectations are high, the employee's performance will rise to meet them.

Because managers communicate constantly, both verbally and nonverbally, it is almost impossible for them to mask their expectations. Everything managers say and do serves either to reinforce employees' confidence or to destroy their self-esteem. Effective managers are aware of the influence of expectations and monitor their own expectations to keep them high.

Effective managers also recognize employees' achievements and reward excellence. The reward need not be an increase in salary; MIS professionals show equal or greater response to new technical challenges, increased responsibility, better training and management opportunities. Managers who want to maintain a high level of productivity must understand what rewards motivate a particular employee and must look for opportunities to grant them.

Professional competence. Professional competence for MIS managers embody two skills: management prowess and technical expertise.

■ Management skills are a necessity. Without them, MIS managers cannot effectively organize their staffs' work or use their employees' talents.

Often, MIS managers have been promoted to their positions because of a series of accomplishments as technicians. Although each level of technical work has prepared them for the next level, none provided training for the role of manager. Managers who find themselvs in this position should seek other sources of information and training.

Individual classes, or the more involved pursuit of a management degree, are ideal. Most universities recognize professionals' needs and offer classes scheduled and paced for people who hold full-time jobs. Organizations like the National Management Association also offer excellent management training that can be conducted at the office.

> *True gains in productivity can only be accomplished when managers motivate individuals to reach their potential.*

■ Technical skills are equally important. Without them, MIS managers will have no ability to make intelligent, informed decisions.

Some managers come to MIS with plenty of management skills but little understanding of the technical problems that MIS employees face on the job. MIS managers must make decisions daily on hardware acquisition, software development, systems schedules and other issues. Each decision requires knowledge of different technical subjects.

Managers who lack specific technical knowledge find themselves in a difficult situation; to get out of this position, there are three moves:

■ First, when managers do not understand some aspect of a problem, they should ask for an explanation. Employees will quickly detect any attempt to mask a lack of understanding, and their perceptions will harm the manager's credibility.

■ Second, managers should use

See **GAINS** SR/30

Huling is a systems analyst and project leader with Vulcan Materials Co., a Birmingham, Ala.-based chemical and materials company. He is a frequent contributor to Computerworld's *Special Reports.*

Special Report

Function Points helps managers assess applications,

By A. J. Albrecht
Special to CW‡

Almost five years ago, in October 1979, the Function Points productivity measure was presented to Guide and Share, IBM's users groups, and at the IBM Application Development Symposium in Monterey, Calif.

The original objective of the Function Points work was to define a measure for applications development and maintenance functions that avoided the problems inherent in productivity measures in use at that time.

In effect, the measure was intended to help managers analyze applications development and maintenance work and to highlight productivity improvement opportunities.

The original intent of the measure has not changed over the years. As originally designed, the measure will help to focus management attention sharply and objectively on the vastly different levels of applications development productivity being achieved within a DP facility. This is done by establishing a single common measure of an application's I/O products, inquiries, master files and interfaces to other systems.

The method is dependent on the three following elements:

■ **The measure must be technology independent**. The measure gives the same number for equivalent applications functions that are based on the external design document regardless of the programming languages or technologies used to deliver the applications.

■ **It must measure all the applications functions delivered to the end user.** The measure gives the same number for equivalent applications functions even if large portions of an application were delivered with labor-saving techniques, including the extreme case of avoiding the programming altogether by buying an off-the-shelf application.

■ **It must measure only the applications functions delivered.** The measure gives the same number for equivalent applications functions, regardless of the obstacles to productivity, such as a bad development environment, an indecisive application user/owner or inexperienced programmers.

In effect, the Function Points method measures the equivalent functions of end-user applications regardless of the language, technology, technique or development environment used to create the applications. This common measure of applications' functions can then be divided by the amount of time expended on the product to estimate the applications' productivity value.

The productivity value of various similar applications can then be analyzed and compared to determine the languages, technologies, techniques and development environments with the greatest effect on productivity. With this information in hand, managers can objectively and systematically change the things under their control to promote higher productivity.

The resulting improvement trends would be demonstrated by tracking the trends with the same measure, namely, Function Points delivered per work month.

The Function Points future

Since that first presentation, a number of conferences and articles and a lot of activity have demonstrated that wide interest in the measure exists both inside and outside of IBM.

Outside IBM, I have participated in over 25 Function Points conferences involving more than 400 companies worldwide. There have been Guide and Share projects to develop the use of Function Points. At least two users groups have been formed to exchange data about Function Points measurements.

Inside IBM, the Function Points idea is evolving into a major measure of applications development and maintenance productivity. For example, a 1984 IBM study of applications development and maintenance productivity reported the following:

■ The delivery of 241,000 Function Points for internal IBM use with a work effort of 11,200 work months; an average productivity of 21.5 delivered Function Points per work month.

■ The support of 1,115,000 installed Function Points with an annual work effort of 6,200 work months; an average unit work effort of .72 annual maintenance work hours per installed Function Point for internal IBM use.

Futher analysis of this data, and of another set of Function Points data from a cooperative industry study, confirmed that vastly different levels of applications development productivity existed.

The projects reported on by 23 individual IBM sites showed a site-pro-

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Albrecht is an IBM senior technical staff member based in Purchase, N.Y. He first proposed and defined the Function Points productivity measure in 1979 and has spent a portion of the intervening years in its practical definition and use.

Special Report

maintenance values

ductivity range from 11 to 65 Function Points delivered per work month.

The cooperative industry study, coordinated by J. Edward Kunkler of Xerox Corp., reported that 19 companies averaged a productivity range of four to 65 Function Points per work month. Since these are site and/or company averages, the individual projects vary over an even wider range.

There are valid reasons for this wide range of productivity ratings as follows:

- Generally, sites near the top of the scale are installing a high percentage of applications acquired from other sites.
- These sites are also using high-productivity tools on applications well suited to the tools.
- In the middle of the productivity curve are those sites that use a broad mix of techniques and whose projects range from small to large.
- Near the bottom are sites that have central development responsibility for large applications supporting many diverse users.

The productivity of each of these levels is, in turn, influenced by the effectiveness of the project management, the maturity of the applications users and owners and the training and experience of the project personnel with the languages, technologies and techniques being used.

Improvement possibilities

Clearly, there are significant improvement possibilities to be considered when weighing the results of these studies.

More precise statements about the attributes associated with the levels of this productivity spectrum must be developed.

Companies could analyze these attributes and identify those that might offer potential productivity improvements.

Further, those attributes that affect productivity significantly could be considered when designing a project.

Management concerns

The frequent management response to this wide range of productivity results is a request for additional adjustments to the Function Points measure. Managers often ask that normalization factors be added to neutralize the effects of productivity obstacles that are outside of their control or responsibility. Their arguments include the following:

- Since they are not responsible for the work lost by an indecisive applications owner, they should be allowed to include the rework in the output product.
- Programmer inexperience is a result of departmental turnover, and there should be an adjustment to neutralize the effect of inexperience.
- They did not select the programming language; they are stuck with it.

The inescapable problem with making such adjustments is that the resulting measure does not portray the real output product. Two consequences can result, both of them bad in the long term:

- Management's view of the obstacles to productivity can become blurred. Instead of a sharp and objective focus on the true cost of low productivity, the effects of the obstacles to productivity are masked. Obstacles are much more likely to be identified, analyzed and overcome if their true effects on productivity are measured and portrayed.
- The ability to track and portray improvement trends is lost.

For these reasons IBM is continuing its Function Points measurement work with its original objectives: to be technologically independent; to measure all the applications functions delivered to the end user; and to measure only the applications functions delivered to the end user.

> *The measure will focus management attention sharply and objectively on the vastly different levels of applications development productivity being achieved within a DP facility.*

Albrecht

Special Report

The 4GL debate

Fourth-generation languages prompt productivity boost

By Pieter Mimno
Special to CW‡

The rapid proliferation of computers to a wide variety of end users has caused a serious productivity crisis. The demand for new applications is clearly outstripping the ability of professional programmers to supply these applications using conventional development techniques.

In many organizations, the imbalance between demand and supply has resulted in a growing application backlog, increased end-user frustration and a deterioration in the support provided to the organization by information services. New, much more powerful development techniques, accessible to end users, are required to solve the productivity crisis.

One significant trend that developed recently addresses the productivity needs of both end users and professional DP personnel. This trend is the growing movement away from the use of inefficient, manually oriented third-generation programming tools such as Fortran, Cobol and PL/I and toward much more productive, automated fourth-generation language tools.

This new technology enables organizations to use computers and information more effectively and to obtain major increases in development productivity. These products sidestep the process of hand coding applications.

The programming of applications one line at a time using third-generation, hand-coding techniques is a hopelessly inefficient process that must be replaced by more automated techniques. Few organizations can afford the expense, low productivity and unreliability of hand-coded applications.

Hand-coding techniques are incapable of coping with the avalanche of new applications that are already overwhelming data processing centers. In his book, *Application Development Without Programming* (Prentice-Hall, Inc., 1982), James Martin estimates that the number of applications per data processing center is growing at a rate of 45% per year. Over a 10-year period, this rate of growth will result in 40 times as many applications as we now have.

Most development centers currently need a productivity improvement of 10:1 to cope with the rapidly growing backlog of new and pending applications. Over the next 10 years, productivity in the applications development process must increase by a factor of 100.


Mimno

Mimno is president of Technology Insight, Inc. of Marblehead, Mass.

He is also the editor and coauthor of the "James Martin Report on High Productivity Languages."

Organizations that have made a commitment to fourth-generation languages . . . have found they can develop applications much faster.

In order to achieve major improvements in development productivity, it is necessary to do the following:

- Eliminate hand coding.
- Use automated applications development tools.
- Provide end users with automated tools that enable them to access and process information directly to solve business problems.
- Use new prototyping and development methodologies that are tied to automation.

Automated fourth-generation languages have progressed to the point that they can be used to replace Cobol and Fortran for all but the most complex or time-critical applications.

These languages provide a wide range of integrated functions, includ-

See **BOOST** SR/36

Special Report

Marketing clouds language issues

By Ray Bengen and Nicholas Zvegintzov
Special to CW‡

Fourth-generation languages are a marketing skin wrapped around a mix of products. The aim of the vendors is to persuade data processing professionals to buy everything that the vendors have to sell — everything inside the marketing skin. The aim of DP professionals is to buy only what they need.

The "language" in fourth-generation language strictly refers to query and report-generating tools, but vendors want DP customers to think that when they buy the language, they buy all the tools the vendors have in the closet. Some of the tools in the closet are useful and needed. These include the following:

■ Tools for specifying the most visible functions of a data processing system — reports, inquiries, screen formats, graphics and so on.

■ The building blocks of a data processing system — data base, data dictionary, communications, development support tools and the like.

■ Applications packages — payroll, accounting, manufacturing support and others.

The challenge for DP professionals is to do the following:

■ Buy tools that they need.

■ Buy the tools at the time that they need them.

■ Fit the tools to the systems and people that the professionals already have.

■ Not lock themselves into proprietary straitjackets.

Fourth-generation language products can be bought separately when a customer persists. Try out a vendor by asking for something specific. If the system is so general that it will match every need, but not specific enough to match your shop, avoid it.

The fourth-generation language marketing approach is designed to convince DP management that they need an entirely new system for creating applications and that they need to replace everything in their shop with it. Some of the arguments promoting fourth-generation languages make the following claims:

■ Most shops have an application backlog.

■ There are not enough programmers.

■ Users should do their own programming.

■ Systems must be integrated.

■ Most DP systems are old and worn out, and, therefore, fourth-generation languages are needed.

This approach lacks substance for the following reasons:

■ Backlog is not the central issue in most shops. Users always want more than they can get, but that is human nature.

■ Programmers are in fairly good supply; in fact, there is a surplus of entry-level programmers.

■ Users do not want to do their own programming. If they did, they would be in data processing.

■ Integrated systems are not essential, and they bring their own problems. The more integrated the system, the more difficult to adapt to existing constraints and the harder to maintain.

■ Most currently installed systems are old but not worn out. Most systems managers would like to keep the old systems and build new features on top.

Given these weaknesses, the future of the fourth-generation language marketing approach is dim.

The fourth-generation shakeout

DP professionals should also note that within the fourth-generation marketplace there has been a ferocious shakeout. Most fourth-generation language start-ups have faded away, and there is heavy competition among the larger and older vendors.

Martin Marietta Data Systems now owns both Ramis II by purchase of Mathematica Products Group, Inc.

See **FOURTH** SR/36


Zvegintzov

Zvegintzov is the editor of "Software Maintenance News" in Staten Island, N.Y. Bengen is a Philadelphia-based consultant.

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Project Title: Schedule for Well No. 121-005

Start Date (ddmmmyy): 01jul85

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	Activity	Duration	Tail	Head	Target
1	Drill Well	4	1	2	.
2	Build Pump House	3	2	5	.
3	Install Pipe	2	5	7	10jul85
4	Construct Power Line	3	1	5	07jul85
5	Excavate	5	1	4	09jul85
6	Install Pump	6	4	7	.
7	Deliver Material	2	1	3	.
8	Assemble Tank	4	3	6	.
9	Erect Tower	6	6	7	.
10	Pour Foundation	4			
11					
12					
13					
14					
15					

Schedule for Well No. 121-005

JOB	ACTIVITY
1	DRILL WELL
2	CONSTRUCT POWER LINE
3	EXCAVATE
4	DELIVER MATERIAL
5	ASSEMBLE TANK
6	BUILD PUMP HOUSE
7	INSTALL PUMP
8	POUR FOUNDATION
9	INSTALL PIPE
10	ERECT TOWER

JUL 01 · JUL 04 · JUL 07 · JUL 10 · JUL 13 · JUL 16

LEGEND:
- DURATION OF A NORMAL JOB
- SLACK TIME FOR A NORMAL JOB
- DURATION OF A CRITICAL JOB
- BREAK DUE TO HOLIDAY
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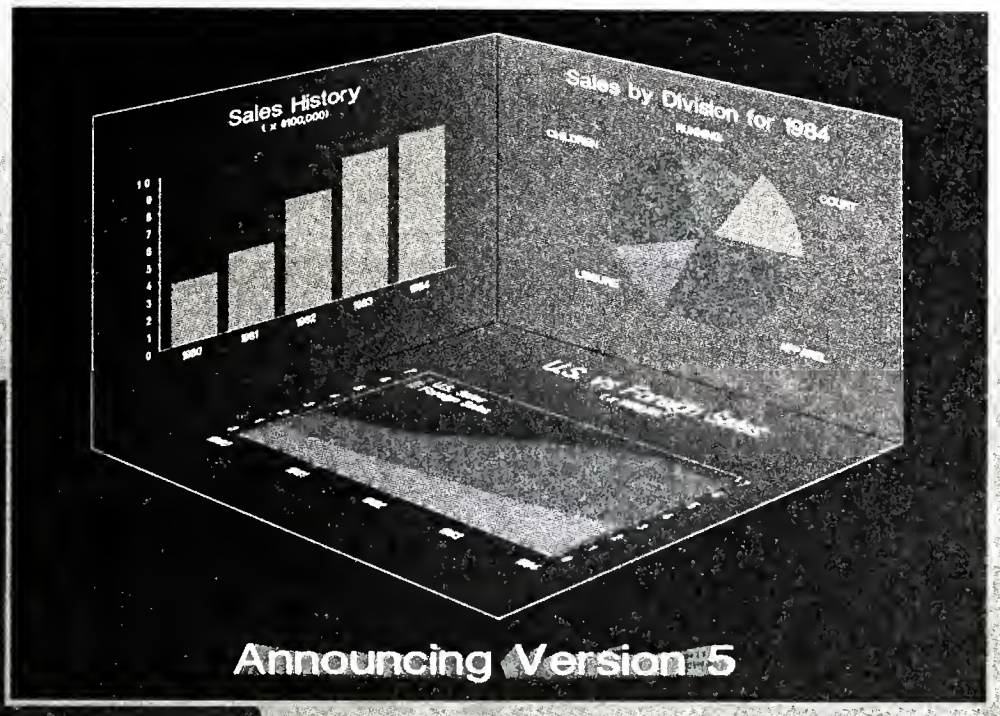

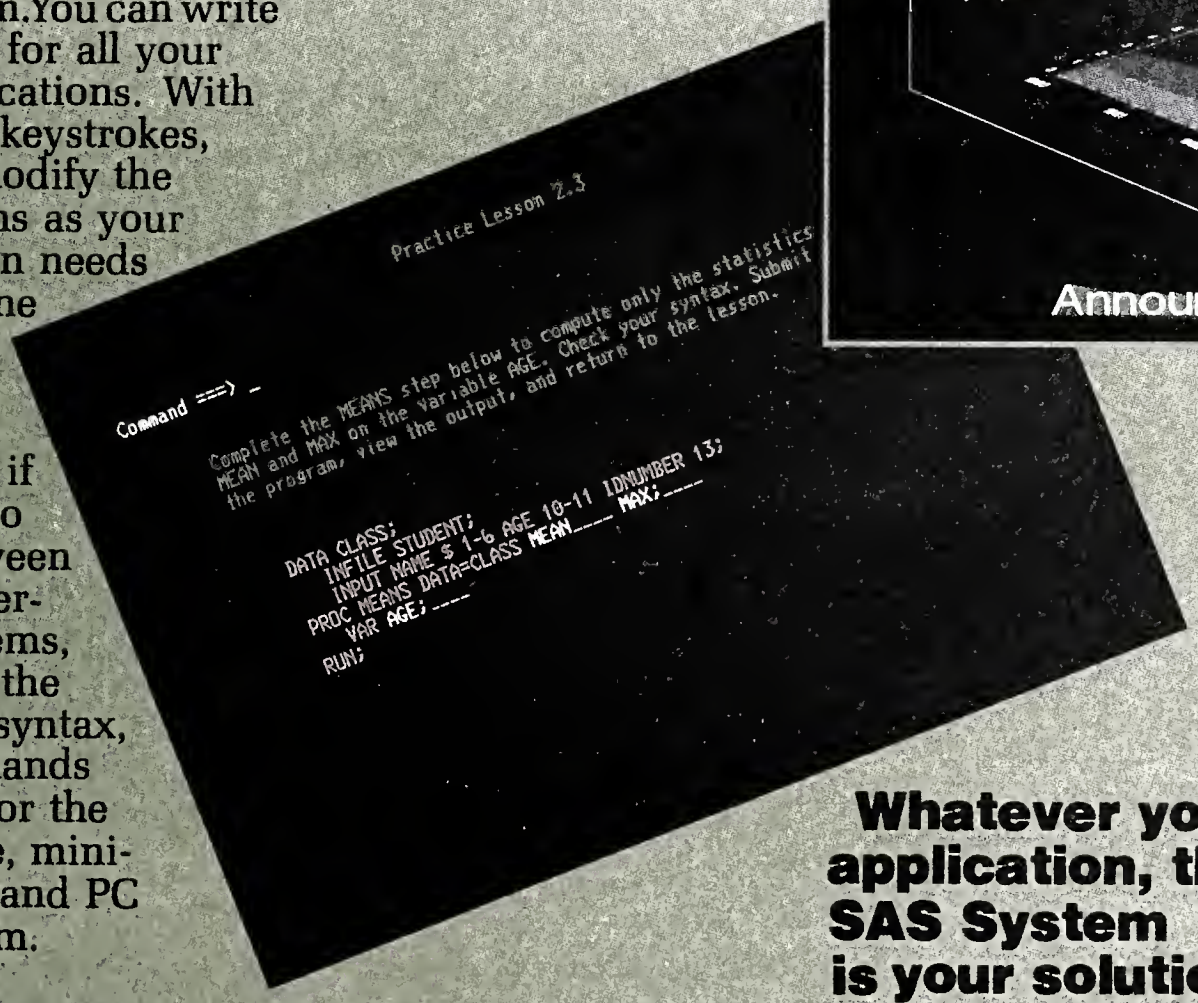

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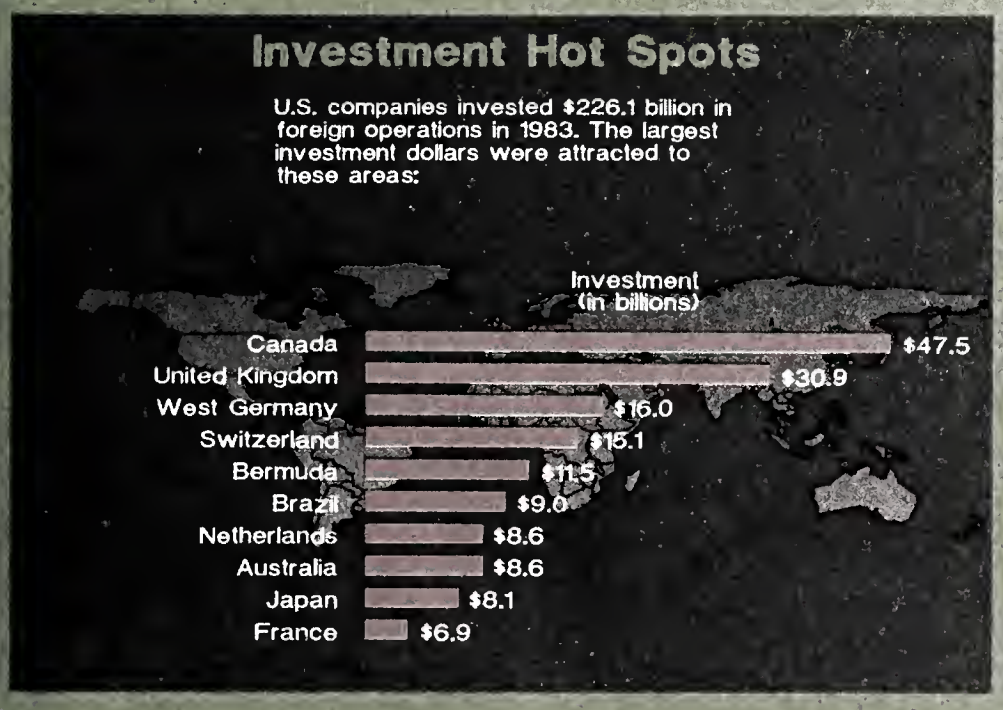

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Special Report

Subsecond TSO response times cultivate productivity

SYRACUSE, N.Y. — By a conservative estimate, a large farm cooperative here has gotten between 53 and 55 programmers' worth of work out of its 50 programmers since it installed applications development hardware and software in June 1984.

The estimate is that of Dennis LaHood, director of systems development for Agway, Inc. And the numbers bear him out: Agway's IBM TSO transactions have increased from approximately 55,000 to approximately 75,000 per day, and the firm has not added to its programming staff.

Agway, a $4 billion concern owned by 104,000 farmers in 12 Northeastern states, oversees farm supplies and food marketing for its members. LaHood's staff develops between 300 and 400 programs a year and maintains a stock of software that handles corporatewide and divisional data.

The cooperative brought in its application development aids last year shortly after it upgraded from two 8M-byte IBM 370/158s to two 12M-byte 3033s — one for development and one for production — in an attempt to end a response time problem that had stalled programmers' work.

Before it upgraded the mainframes, Agway logged an average response time of 6 seconds for trivial TSO transactions on its development mainframe. The upgrade brought the average lag down to between 2½ and 3 seconds and let Agway process 65% of its trivial transactions in less than 1 second. It left room for improvement, however, according to Andy Catts, the firm's manager of technical assistance.

"When we upgraded the CPUs, we had to ask if the new IBM gear solved everything for us," Catts said. "The answer was obviously no." Agway still had two issues to address: consistent reponse time and individual productivity.

Consistent response time. Although response times dropped after Agway installed the IBM equipment, they were still inconsistent: They varied according to the number of other demands on the mainframes.

Individual productivity. Programmers still had to wait for the mainframe to process nontrivial transactions. Their keyboards froze, and the programmers could work on nothing else.

First commercial user

Agway agreed to serve as the first commercial user for an integrated applications development system (see story SR/27). The system, Dialogic/One from Dialogic Systems Corp., consists of a parallel processor, made up of four Motorola, Inc. 86010 chips, that runs program development application software and a series of editors. The hardware sits physically and functionally between programmers' terminals and their host mainframe, which runs software that enables communications (see chart).

Since it began using the system, Agway has consistently off-loaded approximately 40% of its total TSO transactions from the mainframe to the parallel processor, according to LaHood. Overall programmer transactions have increased by approximately 26%, but the number being run on the mainframe has dropped by approximately 20%.

The setup has resulted in average response time of less than 1 second, LaHood said. He calculated that the decreased response time accounted for an increase of at least 5% in programmer productivity, based on a study in "The IBM Systems Journal" that related the two factors.

Because developers have access to their own processor, their response times no longer vary according to other users' demands on mainframe resources; the processor ensures consistent response times regardless of

Special Report

in farm co-op's DP shop

other users' patterns of consumption. LaHood said the setup also shields development from the inevitable rise in demand for mainframe power and the performance degradation that accompanies it.

The Dialogic/One's software components, especially programs that give developers split-screen and Cobol editing capabilities, have also contributed to improvements in productivity, especially for individual programmers.

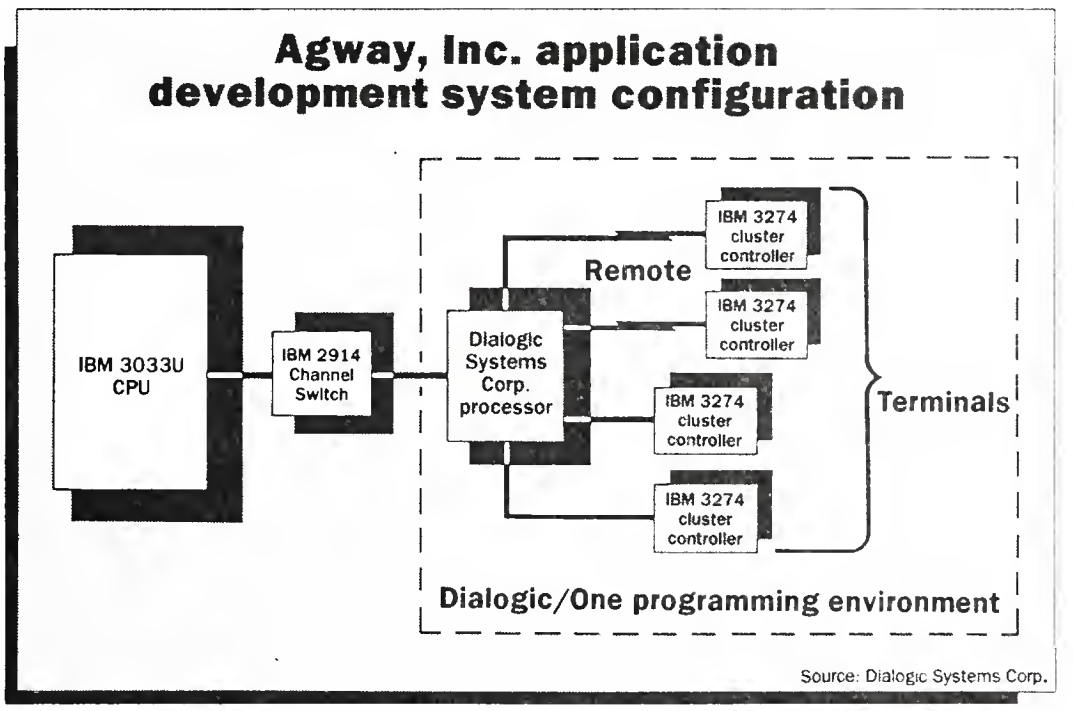
The split-screen capability allows a programmer to perform up to four concurrent tasks. While the programmer waits for one transaction to run, he can work on another one.

Catts said the advantages of this approach over traditional TSO processing have impressed Agway's programmers.

"In the standard TSO environment, you can only perform one task at a time," he explained. "With the Dialogic system, a programmer can sit down at a terminal, split the screen up and do multiple tasks concurrently. It's been great for the productivity of the application development group here."

LaHood said the system's Cobol editor, which allows programmers to check and edit their syntax before they compile a program on the mainframe, has also contributed to improvements in productivity. Without the editor, Agway's programmers had compiled their programs an average of three times before they cleaned up errors in syntax; with the editor, they compile programs just once, on the average.

Besides freeing programmers from the chore of recompiling their work, the editor has allowed Agway to cut costs by reducing the amount of expensive mainframe time devoted to compiling code, according to LaHood. He said logic errors still hamper development, but he knows of no quick solution to that problem.



Source: Dialogic Systems Corp.

First user's policy insures against risks

When Agway, Inc. agreed to serve as the first commercial user of Dialogic Systems Corp.'s applications development system, it took precautions to insure itself against risk.

According to Dennis LaHood, Agway's director of systems development, the farm cooperative positioned itself so that it had everything to gain in the event the system worked as promised and little to lose if it did not.

Agway agreed to try out the Dialogic/One but to sign no contract and pay no fees unless the system met the following criteria:

- **Processed 60,000 transaction/day with subsecond response times.**
- **Displaced at least 25% of TSO processing from Agway's IBM 3033 mainframe.**
- **Was easy to install and support.**
- **Proved to be reliable over two months' time.**

Under this agreement, Agway's only resource commitment prior to acceptance was the manpower expense of physically installing the system, LaHood explained.

Agway ended up testing the system for four months rather than two, because the vendor released an upgraded version midway through the trial period. After the four months, however, the firm was satisfied with the system's performance and signed on with Dialogic.

Special Report

The future of prototyping as a user-friendly DP strategy

By Bernard H. Boar
Special to CW‡

In the past year there has been a tremendous growth and acceptance of prototyping as a requirements definition strategy. This is not at all a surprising fact, as more and more corporations have realized that alternative definition techniques are feasible with integrated fourth-generation software.

Many data processing professionals are interested in learning how they can successfully implement prototyping as well as learning what the future of prototyping will hold.

Predicting the long-range future of prototyping is simple if its future is viewed as part of the natural trend toward friendly, more user-oriented data processing approaches.

The future

What, however, will happen with prototyping during the next few years?

When I gaze into my crystal ball to see the future, I see the following:

Controversy. As is the case with most new ideas and techniques, controversy will surround prototyping. Conservatism, vested interests and skepticism will all contribute to the debate. Many users will be hesitant to experiment fearing that "the leading edge is the bleeding edge."

Though concern is understandable and prudent, the controversy will eventually give way to enthusiasm for this approach.

After all, nothing is radical about an approach that promotes the following:

- Interacting with the users.
- Quickly building a model solution.

> *Predicting the future of prototyping is simple if it is viewed as part of the natural trend toward user-oriented DP approaches*

- Demonstrating the solution.
- Refining the model based on the user reaction.

In the long run, nothing can remain controversial about such a simple, yet elegant, approach to solving the communication problem and finally enabling meaningful user participation.

Every consultant will be a prototyping expert. As the interest and market for prototyping grows, so will the consultant bandwagon of products and services. The information center, data base management system and structured techniques all created huge consulting industries.

There is nothing wrong with this, and, to the contrary, the availability of qualified consulting support can expedite the introduction of prototyping.

Prospective clients, however, should be selective when they go about hiring a consultant.

Prototyping products. Today actual prototyping tools cannot be bought. Rather, one buys a superior product to support conventional development that can be used to support rapid prototyping.

As the prototyping discipline develops, specific prototyping products will be developed.

Such products will be designed around a central integrated dictionary and will optimize the productivity/flexibility of the prototype without regard to production system constraints. The influx of this technology will be especially evident in the personal computer world as multiuser systems with shared data bases become available.

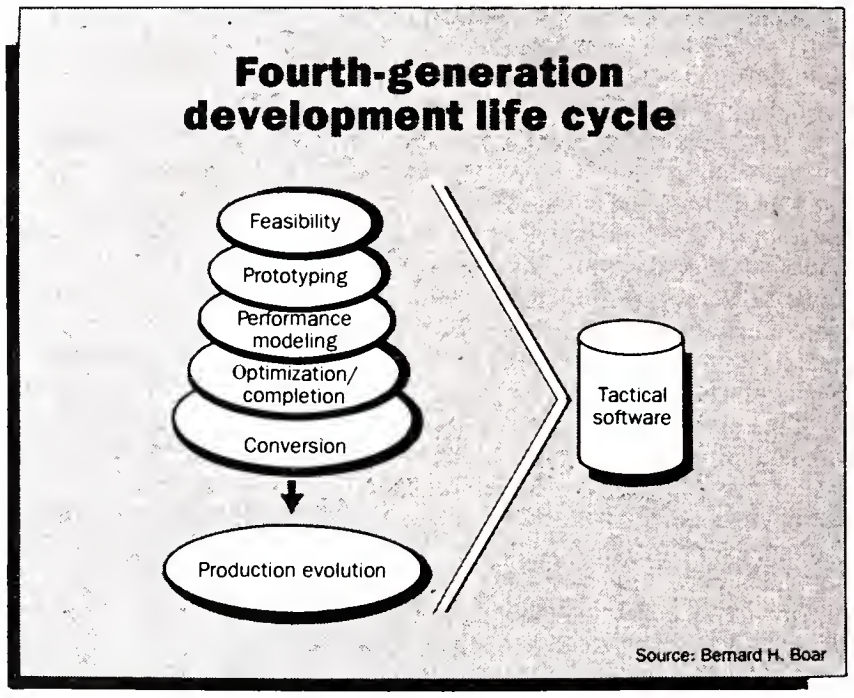


Figure 1. Prototyping is a key stage in fourth-generation development.

Prototyping will displace prespecification. By the early 1990s prototyping will be

See **MODEL** SR/35

Boar is national director of advanced technology for Software Resources, Inc. He is the author of Application Prototyping: A Requirements Definition for the '80s *and is a frequent contributor to* Computerworld.

Special Report

Prototyping system halves insurance firm's backlog

MILWAUKEE — An insurance firm here cut its backlog in half and brought up a valuable strategic system after it switched from a standard development methodology to one based on prototyping.

Before June 1983, when Capitol Bankers Life Insurance Co. installed a fourth-generation applications development system, the firm did most of its programming in Cobol. Capitol Bankers had grown 225% annually for three years, and programmers could not keep pace using a third-generation language. They faced a six- to eight-month backlog.

Today the firm has a three-month backlog, according to DP manager Dan Johnson, and much of the time lag has resulted from increased demand rather than from development problems in the DP shop.

"By dramatically reducing our application development backlog, we have found that we can go back to our users and tell them that they can have more features, instead of fewer," Johnson said. "This made our data processing department very popular."

Johnson's staff works with users to design prototypes with Rexcom, a fourth-generation language and relational data base management system (DBMS) from Rexcom Systems Corp. The software runs on two 6M-byte Prime Computer, Inc. 9950s linked in a ring network.

Capitol Bankers Life

Working with the users

At the start of any development project, programmers meet with users to define basic functional requirements. When these are set, the programmers build interface screens and data bases with Rexcom. They add some simple edits and data manipulations and release the prototype. Users then work with the prototype system, entering test data and generating reports.

Next, the programmers build the system into a production application. At this stage, they add edits and tie in Fortran or Cobol subroutines that can handle heavy calculations better than the fourth-generation language can. When they finish, they release the production system to the users.

For typical applications, those that support new insurance policy types, development takes two weeks from planning to implementation, according to Systems Analyst Tom Ehlen. When Capitol Bankers programmed in Cobol, the development cycle consumed two months or more.

Johnson said the prototyping life cycle gives his shop an edge over organizations that use traditional techniques. "In many DP shops I know of, it takes six months before a new application even enters the development queue," he said. "Here, we are able to sit down with the users, sketch out their functional requirements and present them with a prototype system in just a few days."

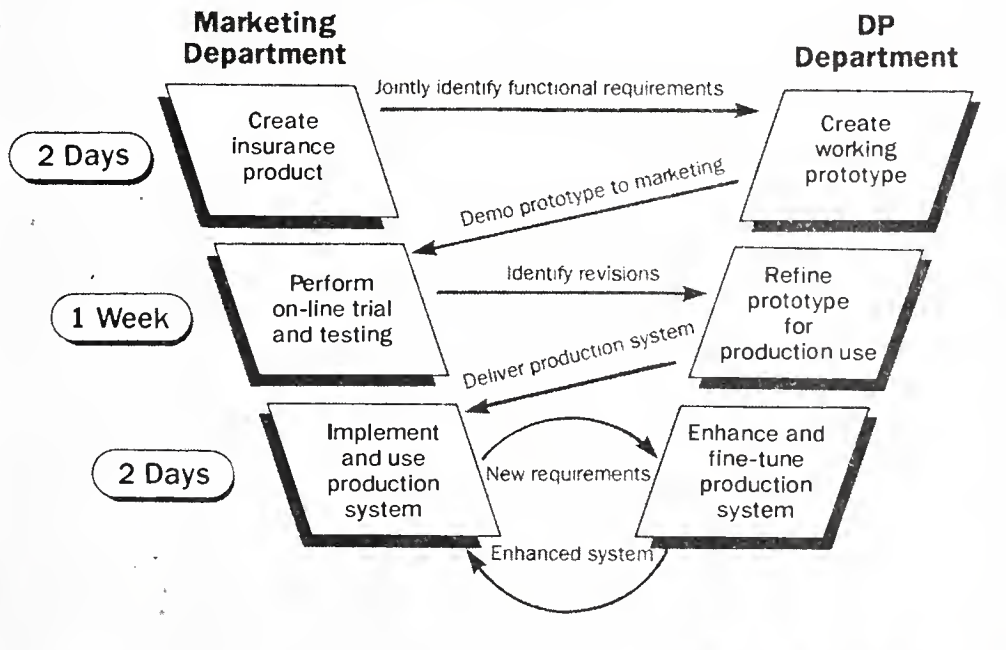
Capitol Bankers has taken advantage of its development tools to create new policy applications, ad hoc reports and strategic systems, most notably an application that allows independent insurance agents in the field to enter policy data to the Prime hosts on-line and print out policies in their offices.

Field agents use a variety of terminals and microcomputers to dial into the hosts via Tymnet, Inc.'s Tymnet. As agents enter policy data, Rexcom applications capture, edit and validate the information. Cobol and Fortran routines then access the data in batch mode.

These routines calculate clients' insurance premiums. Within 20 to 30 minutes, agents can print out a client's policy record.

See **PROTOTYPE** SR/35

Development process at Capitol Bankers Life Insurance Co.



Source: Capitol Bankers Life Insurance Co.

Application development normally takes about two weeks.

Special Report

Fourth-generation languages: What they are and are not

By Arnold Leak
Special to CW‡

Fourth-generation language is a term that has been applied somewhat ambiguously to a number of productivity tools. The ambiguity inherent in the definition is characteristic of the differences found within the set of productivity aids being sold as fourth-generation languages today.

The fourth-generation term was coined to describe tools that were designed to be more productive than third-generation languages for creating applications.

One common objective of fourth-generation languages is to eliminate programmers from the software creation cycle.

Programmerless development

The systems analyst can use the new products to generate prototype programs quickly to show the user. This process is completed without detailed hand coding by a third party; it is in essence, programmerless software development.

To be defined as a fourth-generation language, a product must have the following features: nonprocedural operation (does not require a programmer); natural language (English-like) keywords; links to a centralized data base and data dictionary; efficient code creation; and the capability of creating applications in one-tenth the time (or less) required to hand code Cobol.

The speed of applications creation and the absence of procedural code enable prototyping to be done by nonprogrammers.

Fourth-generation languages must be differentiated from other software with which users or systems analysts can create applications. Products that can be grouped into the non-fourth-generation-language category include query languages, report generators, graphics languages, applications generators, high-level programming languages and parameterized application packages.

Leak is vice-president of technology for Commercial Systems Laboratories, Inc. in Auburn, Ala.

GAINS from SR/19

each such instance as an opportunity to increase their understanding.

They will soon learn which employees are willing to share their knowledge and which are most skilled at explaining technical issues.

■ Third, MIS managers who lack technical expertise can find help outside their shops. There are excellent textbooks and university classes directed toward managers who have little or no technical background.

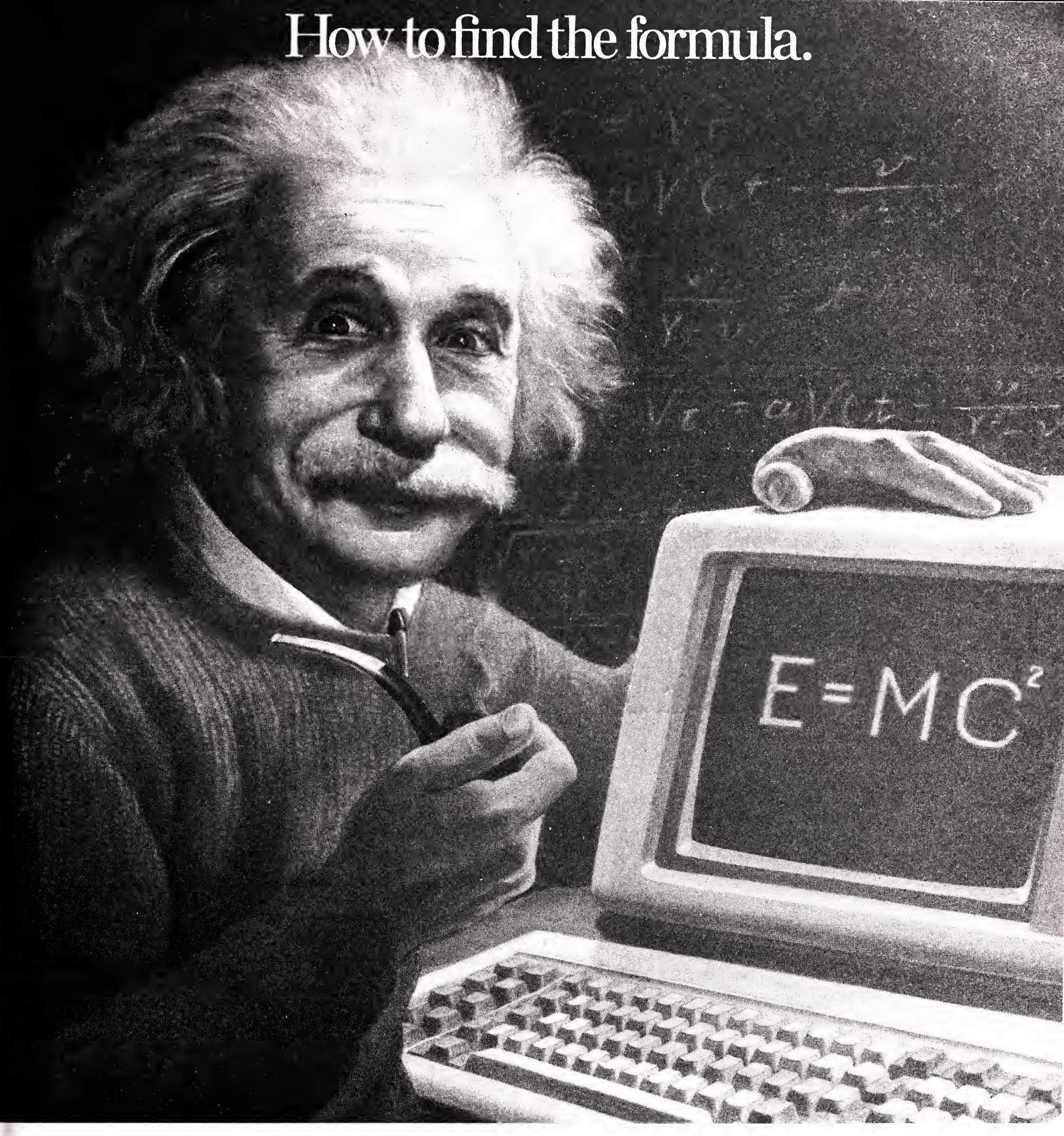
Managers who have both management and technical skills will be able to lead employees to reach their full potential as effective, productive professionals.

Concern for individuals. Effective MIS managers are concerned with their employees as individuals. They respect their differences and attempt to provide the environment most conducive to each one's productivity. Managers must recognize, for example, that some people work best when they have considerable freedom, while others need structure and guidance.

Recognizing and understanding employees' perceptions of their roles in the organization are also critical. Conflicts arise when employees sees themselves differently from the way their manager sees them. To reconcile the two perspectives, managers must talk and listen.

Most MIS professionals have definite feelings about their needs and their roles, and they will discuss these with the manager who has learned to listen.

How to find the formula.



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Special Report

AT&T subsidiary undertakes two-part effort to boost

JACKSONVILLE, Fla. — A two-pronged approach to software productivity is helping an AT&T subsidiary here meet the challenges of the competitive postdivestiture world.

American Transtech, Inc., established by AT&T in 1983 to provide shareowner services during the divestiture, branched out after the Bell system officially split in January 1984. Today, it offers record keeping, direct marketing and other information services to outside clients.

The expansion required massive software development efforts. In the past year, American Transtech has doubled its programming staff from 100 members to 200 and has developed just under one million lines of Cobol code, according to David Adler, the firm's director of information systems development.

Growth, however, was not a sufficient condition for survival in the market American Transtech had entered. "We have a mission to be a responsive provider of quality, innovative information systems to our clients," according to Adler. To prosper, he added, the company had to speed up its software development efforts and keep costs competitively low.

The firm targeted software development as an area that needed improvement. Programming was central to the creation of any service offerings, yet it lagged behind other efforts such as hiring personnel and installing hardware.

American Transtech attacked the problem on the following two fronts:

■ In the DP shop, it brought up a Cobol code generator to give programmers the ability to develop and maintain applications more efficiently.

■ In user departments, it installed a mini-based relational data base management system (DBMS) to allow users to create some of their own applications.

Code generation. American Transtech runs Master Software, Inc.'s Programaster Cobol generator on a 32M-byte IBM 3081. To develop code, programmers work through a set of menus then call on the generator to compile prewritten modules into a working application.

They begin by selecting one of six functions: edit, update, report, sort, merge or explode. Screens within each function guide programmers through the development process. According to the choices a programmer makes at each stage, the generator pulls prewritten modules of code from a library and inserts them into the application.

If a programmer needs to modify the prestructured logic to perform specific functions, the code generator indicates where he should insert new statements. Adler said programmers can store any logic-specific modules they write in the code library, from which they can call for the module in future applications.

On average, he said, the programs American Transtech has developed with the code generator — a group of about 60 programs — consist of about 72% generated code. Programmers developed most of these programs during a five-week trial, after which the firm deinstalled the code generator until the firm signed contracts with the vendor. American Transtech installed the generator in production mode early in July and is currently working on a 50-program application scheduled for completion next month.

Because the firm still has relatively little experience with the product, Adler said, no one has calculated exact savings in time or money. During the trial period, however, programmer productivity (measured as performance against schedule) increased by 28%.

Adler said that in about 10% of all programs, development with the code generator actually took longer than without the tool. This set of programs — mainly those for scientific processing — did not conform well to the generator's set program structure and required extra manipulation by American Transtech's DP staff members.

Because between 80% and 90% of the firm's programs target more mundane applications (financial record keeping and mass mailings, for example), Adler said he expects most development to proceed as fast or faster than it did when the shop used traditional coding techniques.

The firm's main savings, however, have come in the program testing cy-

"*'Software development always seemed to be the slowest step in [our business] growth.'*

— David Adler
American Transtech, Inc.

Special Report

its software development

cle, which now takes less than half the time it once did, regardless of application type. Testing is faster, Adler said, because a substantial part of each new program is prewritten code that does not require testers' attention.

Although programmers initially hesitated to accept the code generator, time savings have helped win them over. Adler estimated the average programmer has chopped between 10 and 15 overtime hours from his workweek.

Programmers' biggest qualm, he said, had been that the generator would make their job an assembly line process, with little creativity involved. Most of them came around, however, when they accepted coding as a routine task and learned to devote their creativity to initial project analysis.

Regina Alai, manager of the firm's development team, said the code generator eventually helped form a strong sense of teamwork among programmers. "We now spend more time communicating and designing instead of coding and testing," Alai said.

"Our software products are of higher quality, and the programmers feel better about their jobs," she said.

In addition, Adler said, programmers have been able to spend less time at their desks and more in meetings with user groups. Through their involvement, they have come up with ideas that help save the company money.

End-user computing. To promote software development in end-user departments, American Transtech recently installed a relational DBMS, Oracle Corp.'s Oracle, on four AT&T 3B2 minicomputers.

In preparation for the software, the firm sent one representative from each of its user departments to a five-day vendor training session. Each representative is currently instructing employees in his department on the use of the product.

Some DP staff members are also helping the user departments, but these systems people are trying to keep their hands off as much as possible, Adler said. "We continue to work closely with our users but have assumed a coach role, rather than a developer role."

Users are still experimenting with the DBMS and its query language, and they have not produced any working applications. But when these users come up to speed, they plan to develop applications for management reporting, manpower scheduling and similar tasks, according to Adler.

He said applications written by end users will not decrease DP's work load or backlog because the department never devoted much time to developing such programs. The DBMS will, however, allow end users to bring up applications they had little chance of ever getting from the systems staff.

'We now spend more time communicating and designing instead of coding and testing.'

— Regina Alai
American Transtech, Inc.

Cobol still going strong, despite grim predictions

By Steven Pfrenzinger
Special to CW‡

Cobol's future is not as bleak as many would have you believe, especially in IBM's IMS DB/DC, CICS/IMS and DB2 environments. It's alive and well as a procedural language embedded within a group of powerful new IMS application generators used within or under the influence of the development center.

The reasons behind why Cobol did not fade away as predicted by the experts are simple.

- No performance-oriented procedural language has been able to replace Cobol adequately.
- IBM has added significant improvements in VS Cobol II.
- Cobol is not really the problem when developing on-line applications.

First, the fact that no programming languages have come along to replace Cobol adequately is nothing new. The shortcomings of other procedural languages are substantial and have included performance penalties, reduced functionality and restrictive architectures. These and other shortcomings have meant no one language can be used in all situations.

Second, VS Cobol II has significant improvements, probably not enough to quiet the ardent anti-Cobol group but enough to show that Cobol can be enhanced to improve productivity during both development and maintenance.

These enhancements include a PERFORM statement variation for in-line looping without GOTOs, the new EVALUATE/WHEN statement combination for complex conditional tests in a case structure, the INITIALIZE and SET statements to assign values to data items and conditional variables, nested COPY statements, a batch debugging tool, formatted dumps and improved compiler listings.

Add to this the command or macro-like feature of some Cobol-based application generators, and Cobol's future looks even better. This feature allows blocks of reusable Cobol code to be built, modified and inserted into generated Cobol programs. These blocks of reusable code can be built by senior developers to blueprint common functions within a system or installation, which provides major opportunities for productivity.

Third, Cobol is not the problem. It is only the language used for procedural logic requirements, and that is not the real challenge in developing on-line applications. The real challenges come from screen definitions (for example, message format service and basic mapping support), data communications interfaces (for example IMS, DC and CICS), data base access (for example DL/1 and SQL), testing, prototyping to validate user requirements and others that have nothing to do with Cobol's merits as a procedural language. Cobol is continually blamed for low productivity in on-line applications development while the items listed above are the real culprits.

Simplifying these challenges is what most of the Cobol-based application generators are attempting to do.

The debate over Cobol's future will likely continue. However, the fact remains that there is a huge base of trained Cobol programmers and plenty of existing and newly developed Cobol systems on which they can work.

Given that we can get substantial improvements in productivity from these Cobol programmers, IMS and CICS installations can follow a more evolutionary, rather than a revolutionary, path to increased productivity.

Pfrenzinger is president of IMS Consulting, Inc., an Encino, Calif.-based consulting firm.

Many of the IMS DB/DC and CICS DL/1 applications generators available for use in the development center use Cobol as the procedural language embedded within them.

DP professionals can use the following list of considerations to assist in the selection process of Cobol-based applications generators. Each consideration can be weighted — high, medium or low — depending on your organization's requirements.

High	Medium	Low	
☐	☐	☐	Integrated on-line, batch and report-generation functions.
☐	☐	☐	Features usable by multiple skill levels, for example, designers and junior and senior developers.
☐	☐	☐	Minimal learning curve and organizational impact.
☐	☐	☐	Screen image painter to generate the native MFS and BMS source statements.
☐	☐	☐	Nonprocedural data validation capabilities.
☐	☐	☐	Prototyping features, usable soon after screen design, that support early demonstration of the system and an interactive approach to design.
☐	☐	☐	High-level commands or macros that simplify IMS data base interfaces (DL/1) and that accommodate DB2 interfaces (SQL).
☐	☐	☐	High-level commands or macros to simplify data communications interfaces (such as IMS DC and CICS).
☐	☐	☐	Ability to leverage senior developers with a command or macro writing feature for building (blueprinting) reusable code.
☐	☐	☐	No significant design restrictions that would limit architectural functionality.
☐	☐	☐	High-performance processing capability (no runtime package or interpretive processing).
☐	☐	☐	Import facility from existing data dictionaries.
☐	☐	☐	Automatic documentation generation capabilities, for example, system and program specifications or documentation.
☐	☐	☐	No runtime package that would affect portability to multiple CPUs.
☐	☐	☐	Features ensuring that developers generate standardized and consistent source code.
☐	☐	☐	Integrated dictionary facility to manage screens, reports, programs, data bases and other system components and characteristics.

Special Report

Documentation boosts systems development effort

By Gary Lansman
Special to CW‡

Systems developers toil to produce documentation for business users but direct little effort toward meeting their own needs. This lapse hinders systems development productivity.

Documentation can improve productivity in systems development, as it does in business applications, by providing efficient means to record and share information. But to take advantage of these efficiencies, systems developers must identify their needs and meet them.

Identifying documentation needs. Documentation should span all phases of the systems development life cycle. To do so, it must encompass three broad categories — strategy, management and technology.

■ Strategic documentation. In order for significant change to occur, managers must make an accurate articulation of the change; strategic documentation accomplishes this.

The strategic documentation process begins with the statement of a company's business strategy. At a high level, business strategy documentation sets an organization's direction for products, services and development activities. Management documents include performance objectives, project schedules, status reports and performance reviews. This category also includes guidelines for systems standards and methodologies and for documentation and investment.

Management documentation supports strategic documentation by giving feedback about a firm's advancement toward strategic goals. It provides the tools for managers to assess and improve their organization's systems development productivity.

■ Technical documentation. Historically, this category has received most of the attention given to documentation. Despite the effort expended at this level, however, problems continue to occur. Run books, for example, do not contain meaningful solutions to unusual system problems.

Meeting documentation needs. Every organization needs an integrated framework of documentation that will promote productivity by helping systems developers reference, share and manage their documentation. For each of the above categories, the framework must provide developers with the following five key functions:

■ First and foremost, it must support easy, reliable and accessible means of referencing development documentation. Developers must be able to use the three classic references found in libraries: author, title and subject. In addition, systems developers should be able to use keyword searches.

Multiple, on-line indexes provide the ability to locate documentation quickly, but not all documentation resides on-line. Any reference scheme, then, must address both on-line and off-line documentation.

■ Second (because, over time, more and more documentation will reside on-line), the documentation framework must provide developers with a means to print some or all of a document on demand.

■ Third, the framework must provide on-line development facilities. Such facilities alleviate many of the problems associated with keeping documentation up to date. They provide change control, for example, which protects users while developers change the system.

■ Fourth, the documentation framework should give developers an opportunity to share some of the unique or interesting ways in which they have used different tools. An electronic bulletin board, for example, lets systems developers improve their productivity by using other people's experiences as a springboard.

■ Fifth, the framework must provide a monitor that collects information on the successful and unsuccessful use of documentation. A monitor provides information that helps answer questions such as: "What documentation is used most frequently?" and "What documentation is sought unsuccessfully?"

> *Every organization needs an integrated framework of documentation that will promote productivity by helping systems developers reference, share and manage their documentation.*

Lansman is a senior systems consultant for Bank of America, which is based in San Francisco.

Special Report

PROTOTYPE from SR/29

With the system in place, Johnson said, "we can now offer our independent agents an industry leader — instant policy turnaround — ... an incredible competitive advantage that no one else I know of currently offers."

Capitol Bankers would not have attempted instant turnaround, either, if it still relied on Cobol programming, he said.

According to Johnson, "We did not even envision such a system until we had Rexcom in-house."

> *'We can now offer our independent agents an industry leader — instant policy turnaround.'*
>
> **— Dan Johnson**
> **Capitol Bankers Life Insurance Co.**

System up quickly

Using the fourth-generation language, programmers brought up the Rexcom system in less than four weeks.

Since Capitol Bankers installed Rexcom, it has used the language and DBMS in about 75% of its new applications.

Programmers, however, rarely write a complete fourth-generation program; rather, they develop data bases and screens in Rexcom and create computational subroutines in Fortran. Johnson said this approach — using the most appropriate language for a given task — has been the reason for his staff's success.

According to Ehlen, Capitol Bankers' users have had few problems with response time, even though the system normally supports between 35 and 55 concurrent users and includes several data bases with up to 100,000 records.

Ehlen, left, and Johnson

Users sometimes have to wait for their initial system inquiry, but subsequent inquiries generally take less than three seconds, he added.

MODEL from SR/28

established as the preferred definition strategy. Prototyping will be used as the cutting-edge definition technique to get a verified agreement on the user's needs quickly. Prespecification methods will then be used to complete those parts of the application that do not lend themselves to model building.

The rationale for this is simple: Prototyping fits naturally the way people normally decide on what they want.

Fourth-generation development methodology. Prototyping will lead the way to a modern fourth-generation development life cycle (see figure 1). The attributes of such a life cycle would be as follows:

- Prototyping will reduce application development risk. The strategy is straightforward: Invest neither substantive human nor machine resources in developing an application until a working model has been experienced, critiqued and agreed to by all affected users.
- Performance modeling will assure operational feasibility. The results of the functional prototype will provide the necessary metrics to permit meaningful performance modeling to assure and define operational feasibility.
- Rapid and responsive application development. More then anything else, users want applications rapidly. By leveraging the prototype into production by optimizing it, the life cycle will be compressed.
- Fully leverage tactical software. The powerful software that enables the rapid prototyping will be extended to the entire life of an application. From feasibility through system evolution, an integrated set of software will track, build and maintain the system.
- The system life cycle will trade conjecture for confirmation. Rather than proceeding solely on paper specifications, the system life cycle will be punctuated by numerous small, rapid experiments to confirm the wisdom of an approach.

In conclusion, fourth-generation system development will bring together many of the best current ideas on software development and package them into a responsive but orderly process.

The trend toward a user-friendly DP style is becoming evident. Whether the subject is languages or the user/machine relationship, the trend is clear.

Special Report

FOURTH from SR/23

and UFO by purchase of Oxford Software Corp. Dun & Bradstreet Corp. now owns both Nomad2 by purchase of National CSS, Inc. and the Millenium development harness through its purchase of McCormack & Dodge Corp.

SAS Institute, Inc. bought the System 2000 data base system. The Canadian conglomerate Crownx bought the Model 204 data base via purchase of Computer Corp. of America.

The software tool conglomerate Sterling Software, Inc. acquired Mark IV by taking over much larger Informatics General Corp.

Standard unlikely

Under these circumstances, it is unlikely that any fourth-generation language standard will emerge.

Instead, existing languages will continue to evolve and extend. IBM VS Cobol II is already available, and Ansi Cobol 85 is due in November.

> *Under these circumstances, it is unlikely that any fourth-generation language standard will emerge.*

As if anticipating this trend, the fourth-generation language vendors are hedging their bets. Applied Data Research, Inc. offers ADR/DL, which is an enhanced Cobol, and Martin Marietta Data Systems announced in June both a Cobol/XE and a PL/I-like System Building Executive.

Supporting existing languages key

Fourth-generation language vendors will survive by moving away from inventing languages and moving toward supplying support functions that are compatible with existing languages.

With this service, they can promise to assist the data processing professional in the arduous task of keeping current systems targeted on current needs.

This is a less magical promise than that of the fourth-generation language, but it is one more likely to be fulfilled.

BOOST from SR/22

ing data query, report generation, graphics generation, decision support, applications generation, micro-to-mainframe links and, in some cases, a fully integrated micro version of the mainframe product. The languages are appropriate for use both by non-DP end users and DP professionals.

Most fourth-generation languages provide a user-friendly front end that may be learned easily by end users to support data base query operations and the generation of screens, reports, graphics and application prototypes.

In many organizations, DP professionals use these tools to create complex applications requiring extensive functionality and large amounts of procedural logic.

Most fourth-generation language tools routinely demonstrate about a 10:1 improvement in productivity relative to Cobol for business applications of moderate complexity. Improvements of 3:1 relative to Cobol are typical for complex applications requiring extensive procedural logic.

These productivity gains are achieved primarily by the nonprocedural components of the tools, that is, the ability to support very rapid specification of data dictionary entries, data views, edit criteria, display screens, menus, reports, graphics and simple prototypes. Numerous users report productivity gains in the range of 10:1 or 20:1 relative to Cobol for on-line transaction processing applications involving large numbers of screens, transactions and reports.

Significantly lower productivity gains, in the range of 3:1 relative to Cobol, are reported for applications that require an extensive amount of procedural logic.

Advantages

Organizations that have made a commitment to fourth-generation languages and to an appropriate development methodology have found that they can develop applications much faster and at lower cost than with Cobol. They are able to develop time-critical applications rapidly and to reduce the backlog of pending applications.

One of the most important advantages of the use of fourth-generation languages is the ability to solve critical business problems quickly and to react immediately to business or market changes through the development of applications and products. Fourth-generation languages may be used very effectively to gain a competitive edge in a rapidly changing environment.

The advantages of fourth-generation languages will become even more pronounced in the future as information services moves away from a mainframe-oriented environment toward an end-user environment dominated by networks of personal computers.

Highly integrated fourth-generation language micro-mainframe tools, such as Focus and PC/Focus from Information Builders, Inc., enable users of IBM Personal Computers to query data on a mainframe, download the extracted data transparently to the micro and automatically format the data for use by standard Personal Computer tools such as Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Dbase III.

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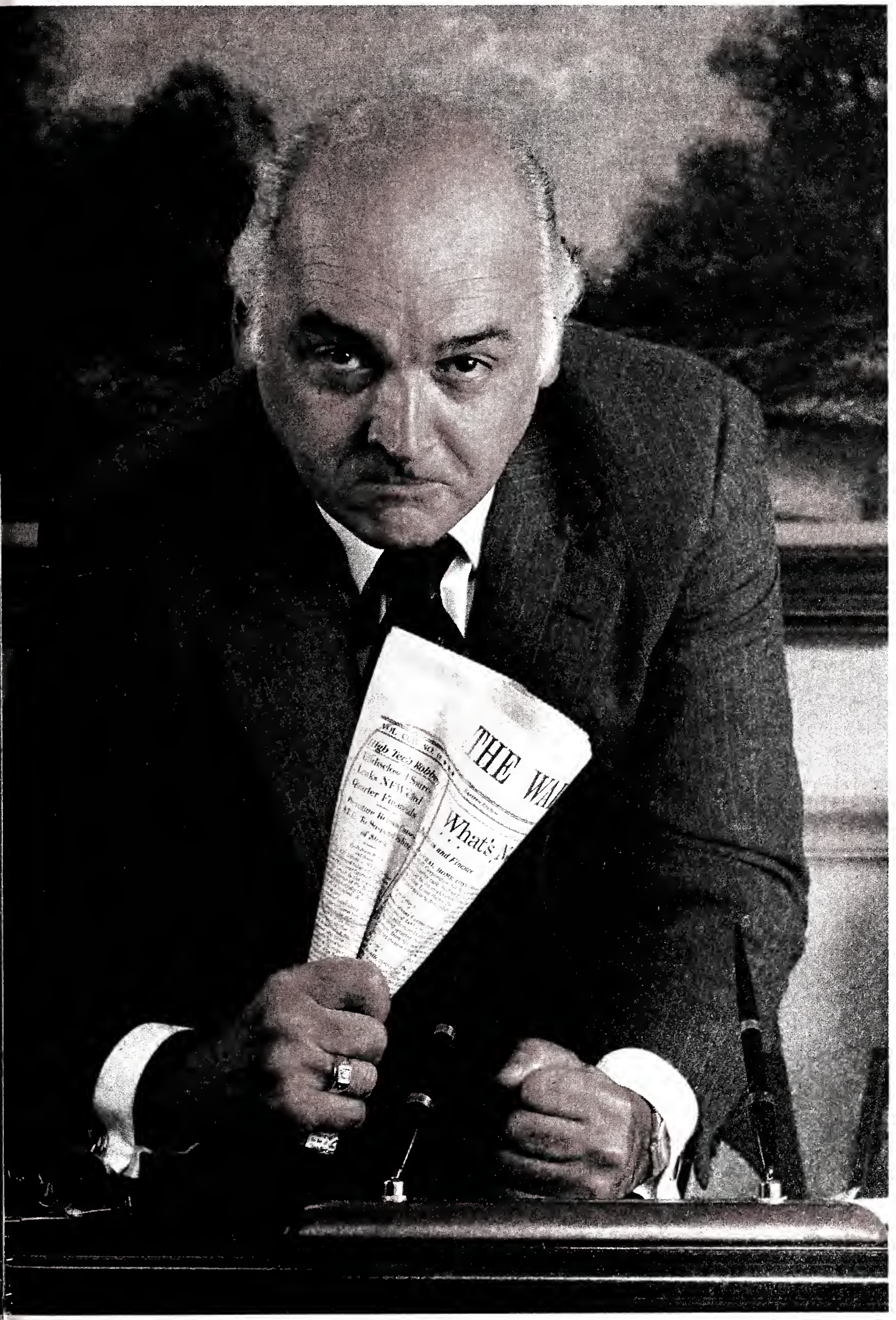

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Special Report

Insurance firm secures DSS with statistical tool

GRAND RAPIDS, Mich. — A statistical analysis software package helped bring together end users and the MIS department at an insurance firm here in a project to develop a decision support system (DSS) during a pressing DP backlog.

Users from the marketing department at Foremost Insurance Co. wanted a system that would help them target new customers and retain old ones by reporting information such as customers' demographics, the time periods during which they held their policies, the number of claims they made and the amount of money the firm paid to them.

Until January 1984, the department channeled requests for such reports through the firm's MIS department. But, according to Ben Salzman, marketing manager at Foremost, MIS was so busy processing information for other departments that it could not turn around marketing's requests in time. "Sometimes, we simply completed report requests on our own, using hand-held calculators and typewritten formats," Salzmann said. "It was not efficient."

Marketing DSS to the rescue

Salzmann and his supervisor Jim Malnight felt that a marketing DSS would help solve the problem. "We needed a DSS to extract data easily, format that data in reports customized by the end users and allow us to bypass that MIS backlog," Malnight said. Because MIS was busy developing a comprehensive billing program for the firm, Foremost contracted a team of outside Cobol programmers to develop the data base for the DSS, which was to be called the Customer Retention Decision Analysis (RDA) system.

Once the data base for the RDA had been established, Salzmann and Cathy Bandt, a customer retention development specialist from the marketing department, planned to format reports using SPSS-X statistical software from SPSS, Inc. "I said, 'Give us a friendly data base, and we'll do everything else with SPSS-X,' " Salzmann said.

Salzmann and Bandt directed the project from the marketing end, and Dave Herbert, Foremost's systems development manager, provided help from the MIS department.

When the Cobol programmers delivered a less than satisfactory data base, Salzmann, Bandt and Herbert used SPSS-X to pinpoint problems and correct them (see story right). After the bugs had been ironed out, they put the software to its intended use — formatting marketing reports.

Pleased with marketing's role in project

Herbert said he was pleased with the marketing department's role in the development project. "RDA was designed, tested and implemented with very few programming resources from the Foremost MIS staff. This is the first time we used this approach, and it's been very successful."

The department is made up of professional staff members familiar with reporting tools, he said, and they had the knowledge to take responsibility for some of the development. The firm had used SPSS software for seven years.

Now that the marketing department's data base system is in place, Salzmann said, the department uses SPSS sorts and aggregates to break the more than 4½ million records in the data base into smaller groups determined by information in the records' fields and to consolidate them into categories for reporting. In 1984, the department ran more than 60,000 SPSS-X jobs on a 16M-byte IBM 3033.

Bandt estimated that SPSS-X and RDA give the marketing department a report output more than 10 times greater than that of the former reporting setup. Staff members now control the format and turnaround time of their reports.

Herbert said the software processes data from the data base efficiently. "SPSS-X doesn't use up a lot of CPU cycles. I would have expected a lot more cycles given what it's doing."

Project kink uncovers resources

Thanks to an unpleasant kink in Foremost Insurance Co.'s marketing data base development, the firm's marketing employees discovered both an unexpected use for their statistical analysis software and some undeveloped talents within their ranks.

The work of the contract programmers Foremost hired to write code for the data base fell short of expectations, said Marketing Director Ben Salzmann. "They completed the entire system, and it didn't work."

To whip the program into shape, Salzmann and his coworker Cathy Bandt put SPSS, Inc.'s SPSS-X package to work as a program analysis tool and put themselves to work as system analysts.

To check for missing information in their Customer Retention Decision Analysis (RDA) data base, they programmed SPSS-X to count the frequency of different categories of records in the data base. They compared the frequencies in the RDA data base with the frequencies of the same categories in other files.

When the numbers did not agree, Salzmann, Bandt and Dave Herbert, Foremost's systems development manager, then worked with the contract programmers to find problems in the Cobol code and correct them. After the programmers changed the code, the Foremost staff ran checks with SPSS-X to make sure the changes had accomplished what had been intended.

Salzmann said that he and Bandt both put more than 3,000 hours into the project in one year. They went to work at 8 a.m., left at 3 p.m. and came back at 11 p.m. when the system was free to handle their processing load.

Herbert also dedicated extra hours to the project. "If we came in from [11 p.m.] to [4 a.m.], he came in at [1 a.m.] to see how we were doing," Salzmann said. Without Herbert's technical knowledge, he said, the system would not have worked.

Bandt and Salzmann also relied on SPSS' analysts to help them. They called the firm with questions and usually got well-considered answers from SPSS employees within a day.

Part of SPSS' enthusiastic support came from its interest in this new use for its software, according to Salzmann. "You take two people out of marketing, give them SPSS, and they use it and function as systems analysts," he pointed out, adding that no one had planned on the package being used this way.

Special Report

Overhead concerns will keep systems analysis in vogue

By Barbara F. Medina
Special to CW‡

Recent articles have suggested that structured systems analysis techniques are obsolete and, by inference, not needed if programmers would only switch from Cobol and Fortran to fourth-generation languages [CW, April 8].

Predictions have been made for 10 to one increases in programmer productivity with the use of data base management systems and query language software. User satisfaction is guaranteed and annoying backlogs in meeting user demand for processing will be cleared up by simply building prototype systems using fourth-generation languages, proponents claim.

Impatient, action-minded American managers, who have always resisted allocating the time and resources needed for planning and systems analyses, are being tempted by these claims. After all, DBMS and query languages do make it possible to get a system up quickly. What many managers do not recognize, however, is that these systems have a high permanent overhead and are a drain on computer resources.

Minicomputers with their single-channel I/O buses are prone to processing problems when I/O demands increase, and a variety of different software packages are used simultaneously. DBMS and query languages increase I/O demands on the system. Although minis are prone to failure from poor application design, even mainframes can get overloaded.

Well-designed data bases and efficiently designed applications can limit problems, and systems analysis is the very tool that uncovers duplication of data in records and redundancies in processing. It is because DBMS and query languages require such a large overhead that systems analysis and planning are a necessity before new applications are implemented.

As languages are developed that make applications easier and faster to implement, the well-trained analyst will be the key to successful use of computers by organizations of all sizes. What data processing managers should advocate is better theories and materials for use in training more proficient systems analysts.

In addition, nontechnical managers have to be educated to understand the long-term benefits of systems analysis and planning. Data processing managers who cave in to the immediate demands of users who want terminals or micros on their desks when they know that they are building inefficient, redundant systems are asking for trouble.

Medina is a consultant and the author of numerous articles and two books. She has also directed computer service bureaus for 12 years.

Analyst's role far reaching

A systems analyst's goals are not always well understood. Some people believe that the sole responsibility of a systems analyst is to produce structured programs in Fortran or Cobol. This is inaccurate. A systems analyst is equally concerned with the needs of the people who use and maintain applications systems.

It can be easily demonstrated that systems analysis, good planning and well-thought-out evaluation criteria for selecting hardware and software are as important today as they ever were.

A good analyst is concerned with several points:

- The goals of the organization.
- The goals of the unit within the organization proposing the application and how these fit into the goals of the organization.
- The analysis of the organization and the application as part of a total system, where the application is one element in a unit with interacting component parts.

The system attributes that are of special concern to the analyst are the following:

- Boundaries of the organization or unit — which employees and what processing must be considered when evaluating the needs of a unit or an organization.
- Data flow and data transfer throughout the system.
- The structure of the system, particularly as the structure impacts data transfer and data flow.
- Feedback loops within the system — that is, data being partially retained by a receiving unit before the information is transferred back to the sending unit.
- Transmission modes within the system. How is data being transmitted within the system from unit to unit?
- Cycles of the system as a whole and of the units within the

See **ANALYST** SR/45

Special Report

Self-interest motivates development

By Roger E. Booker
Special to CW‡

DHAHRAN, Saudi Arabia — The goal for setting up a data dictionary might be described by the following Marxist doctrine: "From each according to his ability; to each according to his need." Experts from different areas provide their input so that all users can access whatever information they desire.

The best way to ensure success in a data dictionary project, however, is to satisfy the capitalist question "What's in it for me?"

During a large data base conversion project that centered on the development of a data dictionary, an international oil firm here used the maxim of self-interest to its advantage.

In 1984, the Arabian American Oil Co. (Aramco) decided to centralize its oil exploration and production information into an integrated business data base. A feasibility study, management approval, conversion planning and data base management system selection of Model 204 from Computer Corp. of America [CCA] had all been completed. The remaining tasks involved design of the new data structure and the conversion of applications software.

But the volume and nature of the interpersonal communication necessary to complete these tasks posed special difficulties for the conversion team:

■ The project would cross the boundaries of two technical disciplines, engineering and geophysics, with inherent differences in terminology and data conceptualization.

■ The data processing staff came from different backgrounds with training in different data base design methodologies and varying exposure to relational concepts.

■ The conversion team was drawn from many nationalities: Saudi Arabian, American, British, East Indian and Norwegian, with the attendant cultural and language differences.

■ By many standards, the conversion was large. It would span a user community of 600 people, with as many as 60 active participants in the conversion process. Nearly 2,000 data elements would be reviewed and more than 250 applications converted.

Early in the conversion process, the firm recognized that a comprehensive and well-maintained data dictionary system could provide the communications mechanism necessary for a successful conversion project. It also recognized the inherent pitfalls of using a data dictionary.

To overcome any disadvantages, the Aramco conversion team took several important steps:

■ It customized the data dictionary software and data structure to meet the particular needs of Aramco's system development methodology. A great deal of software was developed in-house to meet local reporting requirements.

The data structure of the dictionary itself was altered to support specific needs for meta data. Fortunately, this was easy to do because of the malleable nature of Dictionary/204, CCA's data dictionary product.

■ It used the dictionary actively in each phase of system development, from conceptual design to system implementation. The conversion team used

See **OIL** SR/52

Booker is president of Sandrose Software International of Houston, which specializes in data base consulting to the energy industry. Sandrose Software helped the Arabian American Oil Co. during the oil firm's data base conversion.

Data dictionaries: Hits and misses

The Arab American Oil Co. (Aramco) liked the following aspects of the data dictionary approach:

■ A data dictionary provides a structured communication medium. Data is classified by content and then codified and stored in well-defined data structures. Information is free of the structural ambiguities of language, culture or field of knowledge.

■ Development information is highly accessible when it is stored in a data dictionary. On-line query facilities provide efficient and universal access to relevant data.

■ A data dictionary automates information gathering through on-line update facilities.

Aramco also realized that data dictionary systems often fail to live up to their promises — and for good reasons:

■ Organizations need to expend a great deal of effort to collect information and enter it into a data dictionary. Furthermore, this effort is required at the worst possible time — in the midst of data base design and development.

■ If data dictionaries are to be useful, they must be valid, complete and well maintained.

■ Data dictionary software systems are often developed to support a generalized approach to data base development, but the system development process itself is highly variable. This almost guarantees that the dictionary software will not meet the needs of the system development process in a particular organization.

Special Report

Global approach builds flexibility into programs

Lets systems keep up with future changes

By Rusty Williamson
Special to CW‡

Executive management's first thought is to blame MIS managers, project leaders and staff members for backlogs, missed deadlines and bugs. The real cause of such problems, however, is often built into the system itself: Many system designs do not anticipate change and cannot accept it.

If software developers hope to increase productivity, they must plan for the future. A common methodology, the use of global procedures and definitions, can help them do so.

By definition, the methodology relies on two components: global procedures and global definitions (see story below). Global procedures — procedures for common, low-logic-level tasks — are stored on disk files, as are global definitions, which are definitions for common variables, structures and files.

Compiling programs

Programmers can call on the system to compile the procedures and definitions into any program or group of programs that requires them. If a programmer changes a procedure or definition in the source code, the system will compile that change into all relevent programs. With this methodology, coding for most software systems is basic commonsense programming.

Global procedures and definitions reduce development, debugging and support man-hours. Because it removes redundant complexities from main logic, it makes the growing complexity of a system relatively easy to handle. Because it stores common components in one place, rather than in every program, it decreases source and object code memory requirements.

The advantages of using global procedures and definitions span a system's life cycle and can be illustrated using two hypothetical systems: System G, which uses global procedures and definitions, and System B, which does not. Aside from methodology, both systems are identical: Each consists of 125 programs and contains a data base of 45 files.

Development phase. During the first phases of development, Systems G and B proceed at much the same pace. At first, B outpaces G because G's development staff is spending some of its time planning global procedures and definitions disk files.

But System B's development team writes each of its 125 programs from scratch and codes each of its programs and processes as a stand-alone project. System B's development effort soon begins to snowball with increasing complexity and disorganization.

System G's effort is more coordinated. As each program is written, programmers develop, test and debug procedures and definitions. The programmers use these same components again and again in other programs. As the coding of each program proceeds, more global procedures and definitions become available for future development. More and more, developers need to create main logic only.

Time-consuming complexities gradually disappear, and file definitions no longer need to be keyed in. Systemwide naming conventions and one-change enhancements become by-products of development. G's development is smoother than B's and soon outpaces it.

> *If software developers hope to increase productivity, they must plan for the future. The use of global procedures and definitions can help them do so.*

Shakeout. As program development ends, a system debugging phase begins. During this shakeout period, both systems develop a loss of interprocess messages during heavy system usage — a tuning problem. To compensate, programmers must increase time-out values for interprocess messages from .01 to .08 seconds.

Programmers for System B have used a constant value, .01, in the code and must search each program for every occurrence of the interprocess message code, keying in an 8 over the 1 each time. Some of the 125 programs will be affected, and B's development team, not knowing which ones, must search each.

For System G, on the other hand, programmers have used a variable called "INTER-PROC-TIME-OUT," which resides in source code in one place — the global definition disk file. It has been set to .01. One programmer keys an 8 over the 1, runs the compiler and goes home.

The compiler links the new definition, "INTER-PROC-TIME-OUT = .08," into each affected program as the program is compiled (see chart). In each of the 125 programs, every occurrence of the interprocess message code uses "INTER-PROC-TIME-OUT," which is now equal to .08.

Production. During the production phase, Systems G and B, like most large systems, require continued programmer support. New protocols, file formats, applications, reports and other enhancements continually bombard the original system.

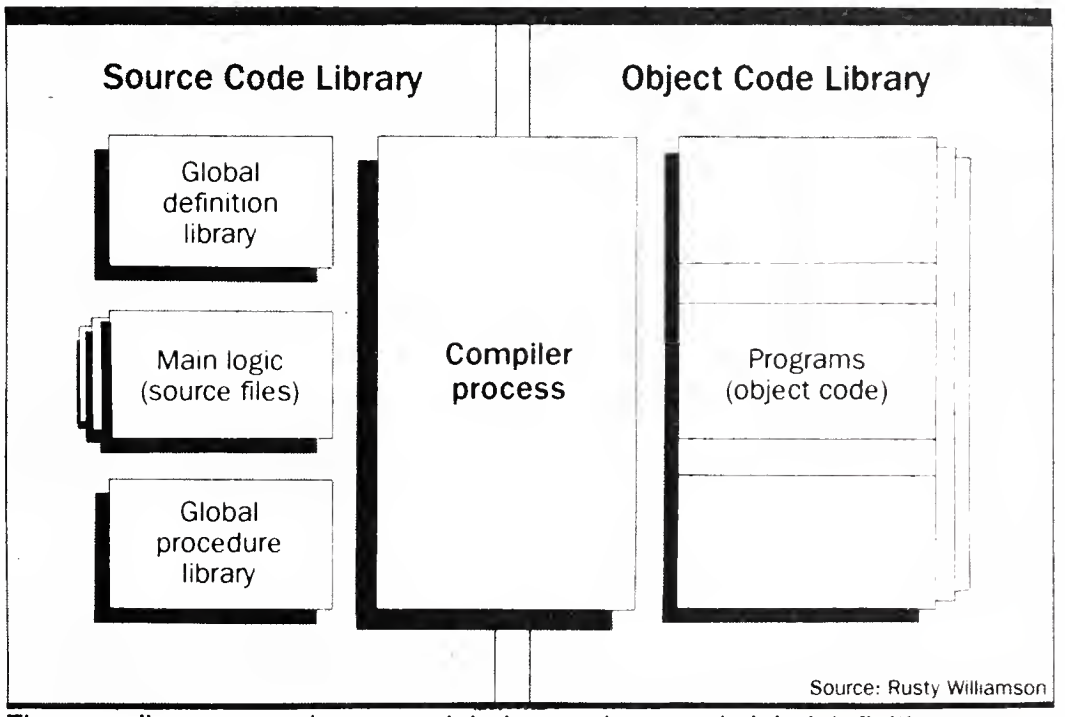
System B requires more programmer man-hours than System G does. Its code contains varying conventions and programming styles, which confuse maintenance programmers and stall their work. Moreover, maintenance employees must change code many times in many programs. Under these burdens, the programming department increases both its size and its cost to the company.

Inside the programming department, this system structure eventually brings on impossible work loads, widespread discouragement and frequent staff turnover. To make matters worse, new employees coming aboard must face the system's bewildering maze; they take a while to become productive.

System G, on the other hand, has a clean, consistent structure that is easy to maintain. Coding enhancements are easier because all changes are global.

Death. Normally, the death of a software system occurs when the effort that goes into continued support or required enhancements equals the effort that a rewrite would entail. System G outlives System B, if for no other reason than its organization and ease of enhancement.

When it dies, however, System G will be relatively easy for programmers to rewrite. If the rewrite does not involve a major environment change, for example, a new programming language, most global procedures and definitions will stay as they are.



The compiler process draws on global procedures and global definitions to create uniform, easy-to-maintain programs.

Williamson is a programmer analyst for Gascard Club, Inc., a Del Mar, Calif.-based company that serves a network of independent petroleum marketers.

Global procedures, definitions: components of uniform system

Global procedures and global definitions are the building blocks of a uniform, future-proof software system.

Global procedures. These are self-contained, parameter-driven procedures that many programs can use.

Source code for global procedures is normally kept in a disk file, from which it can be pulled at compile time for linkage into a main program's source code.

Under this setup, programmers who want to alter any function that is common to a number of programs can do so by making only one coding change.

Once the programmer makes a change to the global procedure's source code, the system recompiles all affected programs, pulling in the newly altered procedure from the disk file.

Global procedures commonly perform such tasks as error handling, device I/O, report generation and screen formation — tasks that a number of programs share at low logical levels.

A procedure that meets any of the following criteria is a good candidate for global treatment:

- The procedure is subject to change and is found in two or more programs.
- The procedure is lengthy and shared by several programs.
- The procedure entails complex calculations or logic.

Global definitions. These are a system's variable names, structure names and file definitions.

Under global procedures and definitions, they are commonly kept in a disk file. Compiler directives then selectively pull the definitions from the disk file and insert them into main programs.

Because definitions are not repeated in each program's source code, the setup saves disk space and reduces code entry.

It also enforces systemwide naming conventions and ensures that changes to file layouts affect every pertinent program.

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Special Report

Solid maintenance spurs development

By Ronald A. Zink
Special to CW‡

Most MIS managers understand that good systems design and programming techniques can help reduce future maintenance efforts. Many do not realize, however, that the reverse is true as well: A good maintenance program can increase development productivity.

One of the most disrupting experiences in the development of any computer system occurs when a project begins to expand uncontrollably in scope, with users demanding more and more features they feel must become part of the system. Such expansion is often a symptom of a poor maintenance program.

In such cases, users who attempt to expand the scope of projects are acting quite rationally, for two reasons:

- They know that if development moves on to a new project, they will see little activity in their area for a long time — years, perhaps.
- They know that, from their company's viewpoint, there may be more productive projects to be done, while nonetheless feeling that it is their turn. They have been subjected to the frustration of waiting in line for years, and they are not about to give up their place until they have gotten as much as they can.

Poor maintenance programs are almost invariably caused not by the abilities of the people involved but by an improper attitude: the attitude of users and programmers that systems should be completed in one fell swoop. This attitude not only forces the user to ask for the definitive system but also causes follow-up maintenance work to become a random series of fixes.

Systems must evolve

Good maintenance programs, on the other hand, arise from a healthier attitude: the attitude that systems must evolve. This attitude allows the MIS department to take a system and break it into a series of optimal implementations, a series of properly graduated steps. It helps the organization move forward in a controlled, low-risk manner.

MIS managers fool themselves when they think they can implement a system that does all it should. They have neither the resources nor the ability to design such a system. A system is never finished; its requirements change constantly because of fluctuating business conditions and the growth of users' expertise.

In reality, managers and their staffs should try to lay a solid foundation that provides key benefits right away and can be built upon later. The DP staff should also plan on revising the system, as part of the maintenance function, on a periodic and scheduled basis. Everyone involved will then be in a better position to evaluate the next step.

Within a system life cycle that includes periodic reviews and enhancements, the user changes his attitude toward any initial development project. Users know they will get their day in court fairly soon, at a time when they will be in a good position to identify the types of enhancements they need.

Developers benefit because they can now concentrate on the major components of a system without being distracted by constant political battles about what features should or should not get added to a project. In turn, the development staff will produce more and better systems.

In order to gain the most from their computing dollars, companies must recognize the opportunity that planned, periodic maintenance affords. Recognition, however, is not enough; they must organize accordingly.

Managers must not sit by and randomly respond to user requests; this is an inefficient way to use valuable programming resources. Rather, they should do the following:

- Make planned and periodic enhancements to systems. Aggressively evaluate all existing systems on a periodic basis to identify justifiable enhancements.
- Divide the maintenance group's work into meaningful and substantial units so it can be done efficiently.
- Schedule enhancements so that they complement group members' skills and can be incorporated in the training of new people.
- Realize that users are rational beings and are willing to wait their turn if their wait is reasonable and fair.
- Maintain users' confidence by working on every system on a periodic and scheduled basis, with the effort being a function of benefits.
- Deliver enhancements the same way software houses deliver new releases: on a periodic, scheduled basis.

Zink is manager of systems planning and support for Beecham Products, a Pittsburgh-based consumer products company.

Special Report

How to negotiate a successful maintenance contract

By Thomas R. Mylott III
Special to CW‡

Software maintenance affects every organization's productivity, and for every organization that relies on outsiders, a contract controls the quality of maintenance.

To negotiate and draft a successful maintenance contract, an organization must pay careful attention to its expectations and must use the best means available to prod vendors into addressing its needs. MIS managers must consider many issues when they put together a contract; the following are the most important:

- Definition of maintenance.
- Duration of the contract.
- Definition of response and solutions.

Definition of maintenance. The first step toward maximizing returns from a software maintenance contract is to define software maintenance. The simplest form is a warranty extension, a promise to correct defects beyond the software's original warranty period. Many maintenance plans go no further.

If an organization's environment is static, an extended warranty will suffice, but few environments are static. Operating systems change, hardware changes and users increase their demands for performance and functionality. MIS managers should make sure that their contracts cover changes in environment as well as modifications and enhancements to software programs.

- Changes in environment. Most software maintenance agreements include no requirement that the vendor change its software to accommodate changes in the user's environment. Many vendors do this as a matter of course, but users should not wait until the time that an upgrade arrives to find out if their vendor is part of this group — they should get it in writing.
- Modifications. Some contracts imply that modifications are part of the regular software maintenance fee, but no vendor can afford to do an unlimited amount of software modification without additional compensation.

Although it may seem clever to allow a maintenance vendor to promise unlimited modifications, it is unrealistic; unless MIS managers ask for very little, they are bound to go beyond what the vendor thinks is reasonable. The result will be a dispute and the user will receive no maintenance at all.

A better approach, contractually, is to define some objective standard by which the user and the vendor can determine how reasonable a request for a modification is.

- Enhancements. Another promise vendors often make in maintenance agreements is a guarantee of enhancements. The problem is defining what constitutes an enhancement. For some vendors, an enhancement is the correction of software errors in the form of a release. For others, an enhancement is a qualitative improvement in the software's function. Any maintenance contract ought to define what the vendor is actually promising.

The MIS manager should negotiate for a written promise that for as long as the organization pays maintenance fees, the vendor will provide the organization with every release of the software at no extra charge. If the vendor improves its software regularly, this provision can save the user organization a lot of money.

Duration of the contract. Duration, or contract term, is an aspect of software maintenance agreements that many organizations overlook.

Most maintenance contracts remain in effect for only one year. Usually they renew automatically for subsequent one-year terms.

Vendors, however, often build an escape hatch for themselves, one that allows them to terminate the relationship as long as they give sufficient notice. The effect of this provision is to allow the vendor to end maintenance after one year. From one year to the next, the user has no assurance of support. This may seem reasonable, but MIS managers must consider the consequences: Without maintenance, a user organization is nearly helpless.

The manager should try to secure, in writing, a guarantee of several years of maintenance, preferably for as long as his firm will use the software. Most vendors, however, will balk at extended maintenance agreements.

The next best thing for an organization to have is the ability to maintain its software in-house. For this, the user needs source code. MIS managers should negotiate a provision in maintenance contracts for the vendor to release its source code if it discontinues maintenance.

Definition of response and solutions. When an organization plans to have outsiders maintain its software, it expects those outsiders to get the job done. It also expects the work to

See **CONTRACT** SR/49

Mylott, a Dallas attorney, is the author of Computer Law for Computer Professionals, *published by Prentice-Hall, Inc.*

Special Report

Dedicated maintenance staff key to smooth operation

By William W. Marks and William D. Strowbridge
Special to CW‡

In most DP shops, programmers who maintain installed production systems consider themselves second-class citizens. They do not get to work with the latest applications and technologies, and they feel burdened with keeping old systems going.

The quality of staff members that managers often assign to these jobs — junior programmers or people with little chance of being promoted — reinforces the perception of low status.

In reality, these should be among the most important positions in an MIS organization. The maintenance group — more appropriately known as production support — repairs and enhances systems that are critical to the operation of the business. This group also supports management's need for information.

Keeping systems current

If an organization does not employ good people to keep its systems current and efficient, it can run into major operational disruptions.

To find the knowledgeable, experienced people who should be performing this role, MIS managers should look for DP workers who have the following traits:

- A business orientation and knowledge of company operations.
- Strong familiarity with the applications systems that need support.
- Problem-solving ability.
- A dedication to precision.

People with these traits tend to enjoy the rapid feedback that comes from solving users' operational problems. Managers should encourage any staff members who want to become involved with day-to-day business to try production support.

Identifying employees who have the personality and skills to excel in maintenance is not enough, however. To keep these experts happy, managers in MIS and user departments must take the following steps:

- Acknowledge maintenance workers' importance.
- Publicize their accomplishments.
- Offer them commendations.
- Compensate them handsomely.

Acknowledging importance. A positive attitude about production support starts at the top. MIS management should explicitly state the value of the maintenance function.

User management should consider support staff members to be an important part of its organization, as well, and should include them in staff meetings, planning sessions and discussions about operational changes. When they attend management meetings, capable production support people frequently make contributions that are worthy of recognition.

Publicizing accomplishments. Many shops ignore their production support staff members unless something goes wrong. This should not be the case; the maintenance staff must come to understand that its contributions are appreciated.

Offering commendations. Management should take advantage of every opportunity to recognize late-night or weekend calls, timely completion of new features or support for new products and smooth installation of releases. This recognition can take the form of public commendations, lunches and awards.

Compensating staff members. MIS managers should never compromise on the quality of people assigned to production support. To be able to hire and keep top-notch workers, managers must pay them well.

Marks is president of Poc-It Management Services, Inc., a Santa Monica, Calif.-based management consulting firm that specializes in information services. Strowbridge is vice-president of MIS for Dataproducts Corp., a printer manufacturer based in Woodland Hills, Calif.

ANALYST from SR/39

system. Are there periods of time when either the organization as a whole or a unit receives no information from outside? How long are these cycles? What happens if they are interrupted by unexpected input or by unexpected requests for output?

No unnecessary processing

The analyst who can evaluate these attributes of a system and can translate their findings into charts, data flow diagrams, data dictionaries and words clear enough to share and evaluate with users and management will succeed in the following two ways:

- He will produce applications free of the unnecessary duplication of record processing.
- He will avoid massive redundancy of data storage.

In addition, he will not select applications software that uses too much of a system's resources for the processes supported or software that loads the computer with an unnecessarily high overhead.

Special Report

Short-shrifting design inflates maintenance costs

By Robert Todd
Special to CW‡

Nothing can replace hard, disciplined thinking as the ultimate means to increased productivity. Software aids, such as code generators, sophisticated data base management systems and query languages, are useful for certain functions but not for critiquing them.

In many companies, $100 worth of software money involved throughout the system life cycle is distributed as follows:

- Analysis — $15.
- Design and coding — $5.
- Testing and debugging — $20.
- Maintenance — $60.

These figures mean it costs more to fix a system after it is delivered than it does to deliver it in the first place, and half the cost of delivering a system is spent testing and debugging it.

The figures also show that if a 10% increase in design and coding can produce a 10% decrease in debugging and maintenance, the cost is 50 cents, but the benefit is $8.

Favorable cost/benefit ratio

Even if it required a 100% increase in design costs to achieve a 10% reduction in debugging and maintenance, the cost/benefit ratio would still be favorable. Doubling the design effort can cut by half the debugging and maintenance effort — surely a worthwhile effort.

These observations lead to the two primary goals of system design:

- First, to maximize the ease of modifying the system.
- Second, to maximize the ease of testing and debugging the system.

These goals show clearly that software productivity aids are useful for implementing a system and for making changes but are not particularly useful for designing the system in the first place. And that is where the beautiful systems are separated from the ugly ones. It is where good old-fashioned thinking shows up as the most fundamental productivity aid.

But what makes a system easy to modify and debug? How can the DP professional recognize a beautiful design, as opposed to an ugly one, and what hidden costs are likely to crop up in a highly maintainable design?

There are two elements involved in developing and maintaining a computerized system — the computer and the people who work with the system.

To a computer, everything is equally simple. A 10-line program in Baby Basic is as complex — or as simple — as a million-line system in undocumented Assembler. Complexity simply does not exist for a computer.

People, on the other hand, are severely affected by complexity. People can handle up to about seven different things at the same time with acceptable error rates.

Before a system can be modified, the modifier, or the programmer, has to understand the system, or at least the program, requiring modification. Understanding will come easier if the program is simple, clear, obvious, direct and without unnecessary considerations of machine or operating system peculiarities, coding eccentricities, obscure data names and so on.

Five design features are strongly related to ease of maintenance:

- Small module size.
- Modular independence.
- Black box characteristics.
- Conceptual modeling.

Todd is a senior systems analyst at Dictaphone Corp. in Bridgeport, Conn. He is a lecturer in systems analysis and design at the University of Bridgeport and a Ph.D. student at the Polytechnic Institute of New York in Brooklyn.

Special Report

■ Isolation of detail.

These five design features lie at the heart of structured design and lead directly to highly maintainable systems. They can be achieved with or without software productivity aids, although good aids are genuinely useful.

Structured methodology works not only because design features have been identified, but because techniques for measuring them have been developed. It is possible to apply uniform standards of measurement to any proposed system and thereby evaluate the quality of the proposed design. The yardsticks of system design evaluation embody the following concepts:

■ Normalized file design.

■ Coupling.

■ Scope of effect and scope of control considerations.

■ Packaging.

But first it is necessary to discuss the concept of efficiency, which is not on the list. Concern about efficiency — from a machine and/or operating system viewpoint — is the unspoken golden rule of programming. It goes without saying that all code should be tight, linear and, above all, make efficient use of machine resources.

The industry has matured to the point where business objectives are far more important than technical concerns. And business objectives are invariably tied to adaptability to change. That means that maintenance is the single most important function that programmers perform. If programmers cannot respond in a reasonable time to reasonable requests from businessmen to adapt to a changing environment, they are not earning their pay.

It follows then that systems should be designed for maintainability and that the best programmers should be primarily responsible for maintenance. In fact, no program should go into production without the blessing of the maintenance team.

If a DP department adopts the principles of structured design, which lead to more maintainable systems, what will be gained or lost?

First, the losses: Systems that are designed for maintainability are harder to develop. It takes more thought, effort and iterations on paper, or with a software design aid, before coding begins. That delays the beginning of system testing, but, somewhat paradoxically, hastens its completion.

Those who do not understand MIS are suspected of these activities. To endorse a methodology that pushes visible progress even further out on the project schedule takes a fair amount of courage, not to mention a considerable sales effort.

Performance loss

Systems designed with this methodology also lose some performance efficiency — about 10%, according to Yourdon, Inc. We lose a similar amount of memory usage with added overhead and, again, a similar amount of disk resources. To take this message to machine-oriented programmers also requires courage and a firm conviction that the longer view is of greater importance to the company — and to the department.

To summarize our losses, we must be willing to tackle the following issues:

■ More difficult, disciplined and time-consuming design effort — and subsequent delay in starting testing.

■ Program performance.

■ Memory overhead.

■ Disk resources.

If you pay this price, what will you buy? You'll buy a system built of independent modules whose single function is known or easily learned. You'll buy a self-documenting system, because it is fully designed before it is coded. You'll buy a system that is structured the same way the business problem is structured and the same way the data is structured. And, because of the preceding factors, you'll buy a system that is about twice as easy to maintain.

There is another consequence of the structured methodology. The laissez-faire approach to coding, in which each programmer is free to express himself as long as the program works, will be a casualty of structured design. As programming matures into software engineering, the artistic aspect becomes subjected to the constraints of guiding principles.

Special Report

Source code librarian conquers tight design deadline

GRAND RAPIDS, Mich. — During a project with deadlines so tight that development and maintenance overlapped, a programming team here relied on a software tool to prevent source code changes from undermining its efforts.

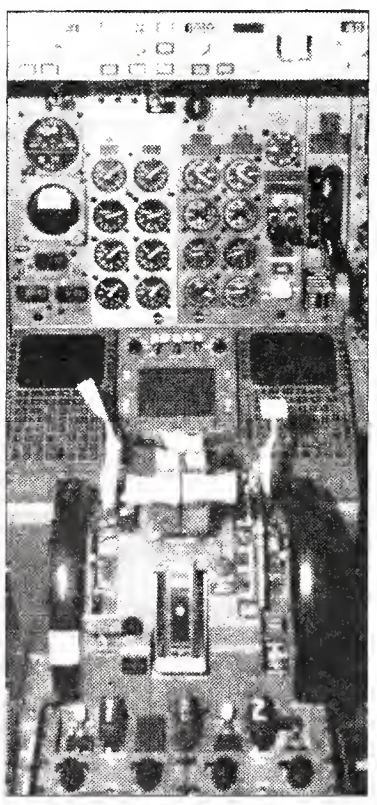
Programmers in the software tools section of Lear Siegler, Inc.'s Instrument Division used the tool to keep track of more than 13,000 code changes during a hectic attempt to design and build a flight management system for Boeing Commercial Aircraft Co.'s 737-300 passenger jet.

The system, which would eventually encompass 800 common blocks of code and 2,000 subroutines, was best suited to a three-year development schedule, according to Katherine Hornbach, manager of the software tools section.

However, Lear Siegler had just slightly more than two years in which to complete it: Boeing ordered the system in September 1982 and planned to have the aircraft carrying passengers by December 1984.

Given the time constraint and the size of the project, development and testing had to proceed simultaneously.

Lear Siegler staffed the project team with about 65 engineers — 20 software development engineers, 25 test engineers and 20 systems engineers — and scheduled them to work through two weekday shifts and weekends.



Lear Siegler's flight management system went from drawing board to cockpit in two years.

Software testers would be running subroutine builds while developers were designing upgraded versions of those same routines.

If the testers made changes to the code, they would have to be able to link those changes into the current development version.

"We couldn't afford to have source code control problems," Hornbach said. "We just couldn't afford to waste time because we linked in the wrong version." Such a coordination glitch could make software problems difficult to isolate and could stall the development project for weeks.

To keep on top of source code changes, Lear Siegler purchased Digital Equipment Corp.'s Code Management System, a source code library utility that controls access to code and keeps a record of changes that programmers make to it. The firm ran the software on an 8M-byte DEC VAX-11/782 under VMS, which programmers accessed through VT100 terminals.

The librarian stored one copy of the original source code. To make changes in any module during the development process, programmers at Lear Siegler checked a copy of the code out of the library. The code librarian recorded the transaction and kept track of who was using what module.

Once the programmers completed their work, they sent the module back to the library, where the code librarian assigned the changed module a generation number, noted the date of the transaction and asked for a description of any changes that had been made.

In the description, the programmer listed the number of the problem report filed about the change and gave reasons for altering the code.

Change incorporated into source code

The librarian then incorporated the change into the source code. Later in the project, when a programmer wanted to re-create any past version of a module, he asked the librarian for the specific generation number, and the librarian compiled the specified version.

Hornbach said the librarian provided Lear Siegler's development team with two important benefits:

- It kept track of the latest version of any subroutine. This ensured that testers never wasted time testing an obsolete version.
- It noted the generation statements that went into any given version of the source code. This helped testers link the proper versions of subsystems into any build they executed.

"All of a sudden we had complete control of our software," Hornbach said. "We know exactly what went on with each module. We have the entire history of the development of that software."

The only problem the team encountered was one of response time. During peak usage periods, the librarian took up to two minutes to fetch a subroutine, according to Hornbach.

She blamed the problem partly on the team's demanding pattern of use — Lear Siegler allowed heavier concurrent use than the VAX was designed to support — and partly on the librarian itself — the software tool's thoroughness accounted for much of the delay. DEC has improved response times in its most recent release of the tool, she said, and Lear Siegler has installed more VAX machines.

Hornbach (above) said a tool that tracks source code played a key role in her team's speedy project completion.

Other problems Hornbach expected, however, never materialized. She said she had worried that the source code library would take up too much disk space.

But the historical subroutine versions used less space than one clear copy of the source code.

She had also questioned the tool's reliability, but said it did not lose one line of code during the entire project.

On Nov. 14, 1984, the Federal Aviation Administration granted full certification to Boeing's 737-300, which included the Lear Siegler flight management system. The plane went into service, on schedule, during the first week of December 1984. The source code librarian played a key role in helping the development team meet its deadline, according to Hornbach.

She said other software — including fourth-generation prototyping tools, a problem report data base, a data dictionary and on-line documentation tools — also contributed to the team's success but stressed that without dedicated people, the project would have failed.

Tools, according to Hornbach, "were a necessary, but not a sufficient, condition for getting the project out."

Special Report

LIBERTY from SR/14

helped to write it.

Liberty Mutual's programming staff wanted to rewrite some of the code to make maintenance more efficient, according to Mike Nerney, assistant manager of systems and programming. But staff members had to devote most of their efforts to developing new programs instead. "We really needed to rewrite," Nerney said, "but we didn't have the staff time."

Despite the resource constraints, he said, Liberty Mutual almost decided to go ahead with some desperately needed rewrites. As the firm prepared to start the process, however, its staff members came across a software package, Group Operations, Inc.'s Superstructure conversion program, that they thought might help them.

'Programs in dire need of rewriting'

"We were in the process of identifying the programs that were in dire need of rewriting when we read an article about Superstructure," Nerney said. The firm decided to test the program to see if it could help defer the rewrites.

Liberty Mutual began testing late in 1983. In May 1984, it installed the conversion program on a 32M-byte IBM 3081. Programmers then started running the conversion program against their unstructured applications. By October, Mooney said, the programmers had restructured the 50 problem applications.

He said the conversion program made the applications' logic easier for programmers to follow. It eliminated interparagraph GOTOs and fallthroughs and removed ALTER statements and altered GOTOs. The program also organized the applications' code into modules, each consisting of a paragraph or a series of paragraphs that performed a discrete logical function.

To test the integrity of the restructured code, Liberty Mutual's DP staff compared output tapes from the original applications with tapes from the restructured ones. Mooney said output from the new code matched perfectly with output from the old code in every application.

No one has calculated how much maintenance time and expense the restructured code has saved the firm to date, but Mooney said programmers have assured him it has made their jobs easier. "The people who work on the programs day in and day out see improvements," he said.

Staff members have fewer problems understanding the logic in the applications, and run books and compiles are much cleaner than they were in the past, he said. Because programmers spend less time deciphering logic, they have more time to devote to development.

According to Nerney, the conversion program has also allowed the staff to keep running programs that otherwise would have required total rewrites. "We thought Superstructure might buy us some time, and it is doing that," he said. "It has helped us to defer the costly rewrite of at least 50 programs, without tying up programming resources needed elsewhere."

Nerney said Liberty Mutual will eventually rewrite many of the programs, but only to answer functional needs — not in response to maintenance problems. "Eventually, the existing versions are going to outlive their usefulness," he explained. "Then we can rewrite."

Besides using the conversion program on unstructured code, Liberty Mutual's programmers have experimented with running Superstructure against programs written under the firm's structured methodology. But Mooney said the results of the experiments were not dramatic.

Because most of the required restructuring is complete, the conversion program is no longer in heavy use. Liberty Mutual maintains it in a library, however, and programmers call for it when they have need, Mooney said.

CONTRACT from SR/44

be completed within a reasonable amount of time. Software maintenance contracts, however, rarely address the timeliness of a vendor's work.

To solve any software problem, a vendor must first respond to a request for assistance. Response varies among vendors: Some consider the logging of a user's telephone call as a response; others define a response as the assignment of personnel to solve a problem. If the user does not define — in writing — what constitutes a response, the vendor will make his own definition, and the definition is likely to vary over time to suit the vendor's work load.

In addition to defining response, the user organization should try to install in its contract a mechanism for expediting solutions. The MIS manager can establish a contractual time frame for a response, but any attempt to force a solution within a specific period is unrealistic. Some problems are more difficult to solve than others, and few vendors will promise to provide solutions within a given number of hours or days.

A user organization can, however, structure its software maintenance agreement so that the vendor has an incentive to fix problems. One way is to have the vendor promise to assign certain personnel to the problem after a specific period of time has passed; another is to have the vendor agree to send maintenance people to work at the user site until the problem is resolved. Such incentives do not guarantee a solution, but they increase the chances of finding one.

Software AG Users spell it out...Datapro™ survey rates ADABAS

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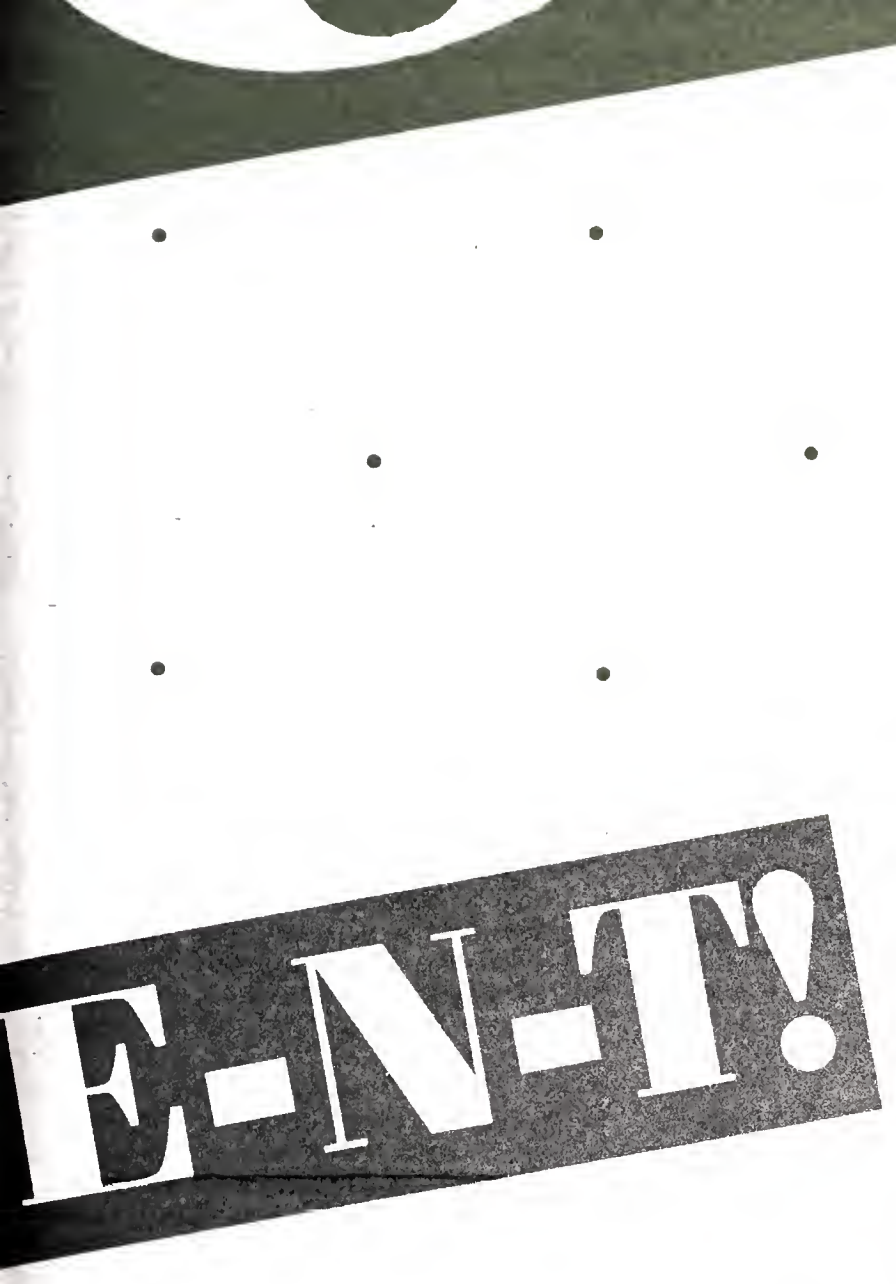

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Special Report

OIL from SR/40

the dictionary as a tool to complete the development effort, not as a repository for after-the-fact documentation of the completed system.

■ The team wrote several data base applications that directly accessed the dictionary data as part of their processing. These programs provided a quality-control mechanism for the accuracy and currency of the dictionary data.

■ Aramco took great care to ensure that anyone on the development team who served as a source for dictionary information received tangible benefits from using the dictionary in his part of the development process.

With these safeguards in effect, the project was successful. People from every part of the development group cooperated. In return, they all received some strong benefits.

Users. The user community, composed of engineers and geophysicists, was the ultimate source of information about business data and activities on which the data structure and applications would be based.

For every data element to be converted, users were assigned the task of entering into the dictionary a concise definition, units of measurement, encoding schemes, reporting precision and business-based editing rules.

In return for this arduous effort, the user community gained many important benefits. The completed dictionary would provide ready-made documentation of the system, a valuable aid in the formulation of ad-hoc queries. Dictionary-driven reporting software printed tables with prestored headings, element-based reporting precision and value decoding, thereby reducing dependence on the DP staff for the development of simple applications.

Most importantly, the user community achieved a significant degree of control over the content and structure of data in the resultant system.

Logical designers. The logical design team added information about data base structure into the data dictionary. Team members grouped data elements into records and subject data bases, identified logical keys for each record and defined important inter-record relationships and structure-based editing rules.

They were able to use the user-generated definitions in their data analysis efforts. In addition, several dictionary applications were written to aid the logical design process. Reports were generated that showed proposed record layouts in each phase of data normalization. Structure charts depicting inter-record relationships were generated directly from the data dictionary to serve as road maps for data navigation.

Physical designers. The physical design team added information about size and estimated number of occurrences of each record and data element. It also modified the logical structure where necessary to improve performance.

The physical designers were able to use the dictionary information that had already been entered by the logical designers, modifying it to reflect the physical tuning. They then used the Dictionary/204 system to generate the data definition statements necessary to build the physical data base.

System analysts. The system analysis group designed the dictionary software enhancements as well as the data conversion software and data base applications. Group members used the data dictionary to describe conversion algorithms, defining a source for each target data element in the new data base.

The system analysis group enjoyed many benefits from the dictionary. The data elements, records and structures previously defined reduced the time required to design and document the data base applications. In addition, it now became possible to design dictionary-driven generic systems.

One design effort, for example, included the development of a generic update system that would update any data base record based solely on data in the incoming transaction and the information on data structure and editing rules previously stored in the data dictionary. This generic process eliminated the need to develop hundreds of update modules, one for each record in the data base.

Programmers. The programming team developed the programs that extended the dictionary function to meet the needs of the other groups. Programmers also entered into the data dictionary information about which data elements and records were used in each program developed.

In return, the programmers were freed from a great deal of trivial coding. Code generators were written to generate record descriptions in the PL/I and SAS languages in a manner that allowed the descriptions to be included directly in an application program.

Data administrators. The data administration group was responsible for overall dictionary maintenance and development. Administrators developed standards for data element names, units of measurement and reporting precision and generated quality control software to validate the meta data in the data dictionary.

The data administration team used the dictionary to make impact analyses (for example, What programs will be affected if we change this data element?) and to facilitate development of data standards. Team members generated comparison reports, for example, that showed the units and precision for each data element of a general type.

MICROCOMPUTERS

Aion offers AI development system

LOS ANGELES — An expert system development environment that runs on IBM Personal Computers and is targeted at solving well-understood problems was introduced last week by Aion Corp. at the International Joint Conference on Artificial Intelligence here.

Aion's Application Development System/Personal Computer (ADS/PC) is designed to permit experts who lack artificial intelligence training to create expert systems, according to Aion President Harry Reinstein. Priced at $7,000 and scheduled for commercial availability Oct. 15, ADS/PC is aimed at use within traditional DP environments.

Likely candidates are systems that can be implemented in less than six months that would have been done anyway without expert systems but that require judgment rather than mathematical computation alone and that can benefit a number of employees whose current job performance varies widely, Reinstein said.

ADS/PC consists of two parts, an Application Building System that includes the development functions required to create text and run knowledge-based systems and a runtime Application Execution System.

The Application Building System, which requires 512K bytes of internal memory, reportedly contains a set of intelligent editors. Each editor shows users a screen, allowing them to select various options, such as creating or modifying an object. The editors include Help facilities and semantic and syntax checkers. Aids for verifying and analyzing the completed knowledge base also are built in.

The Application Execution System, which requires 320K bytes of memory, interacts with the end user, directing a dialog with the user and providing Help functions and explanations of system conclusions.

Written in Pascal, ADS/PC offers subsecond response time to questions on a standard Personal Computer, with disk I/O the biggest limitation on performance, Reinstein said.

Aion also will develop software for other IBM machines, with a version for IBM 370 mainframes scheduled for delivery in first-quarter 1986, Reinstein said.

The company plans to sell to both software developers and MIS departments. "We're a little more focused on the DP/MIS environment than when we started," Reinstein commented. In each case, Aion said it expects to work closely with its customers, providing consulting and training services, with the overall cost of products and assistance typically ranging from $100,000 to $500,000.

"In any new technology, one can build excellent products the first time, but they are almost always not perfect," he said. "We want to stay very close to the people who are building the initial products."

Founded in May 1984, Aion received $2.4 million in venture funding last February.

The company is located on the Fourth Floor of 101 University Ave., Palo Alto, Calif. 94301.

■ Datacopy introduced a high-speed image scanning/storage system that works with the IBM Personal Computer XT and AT/**56**

■ Interface Technologies unveiled software that gives Modula-2 programmers access to Lotus' 1-2-3 files/**60**

INSIDE

Software/**60**

Slow DSS sales laid to lack of user knowledge

SMALL TALK
Eric Bender
CW Senior Editor

Although the Lightyear, Inc. Lightyear decision modeling software earned mostly good reviews and received a lot of press attention, only 3,000 copies have sold since the package, designed for the IBM Personal Computer, debuted last November.

What barriers did Lightyear face, and what do they mean for innovative microcomputer software in general?

Chris Christiansen of the Boston-based Yankee Group, who calls Lightyear "a great little program," feels that the biggest holdup was in education. "They didn't have the money to educate the public on what kind of decision support system [DSS] it really was," Christiansen said. "It basically was a tool that very few people knew how to use effectively. Very few people had enough imagination to know what to do with it."

Terry Garnett, Lightyear's founder and chairman, agreed, drawing an analogy to micro spreadsheets, which have been around since 1978. "The calculator really set the stage for spreadsheets," with thousands of people familiar with Hewlett-Packard Co.-style calculators making a natural progression into spreadsheets, he said.

But DSS software has lacked that kind of metaphor, he maintained. "This category is so new that it will take a while to develop. The barrier is more time than anything else."

While Lightyear often is described as a decision-making tool, that's misleading, because it makes decisions no more "than a word processor will write a book for you," Garnett said. Instead, it's aimed at examining explicit reasoning for decisions — a task often now addressed via spreadsheet.

Another slowdown came in marketing

See **DSS** page 63

Visage boosts V:Station videodisk line

Adds icon-oriented V:Tools for applications development

NATICK, Mass. — Visage, Inc. has enhanced its V:Station series of interactive videodisk systems to include V:Tools, an icon-oriented software package for applications development. The V:Stations are IBM-compatible personal computers that interface with a videodisk player to provide an interactive video system for training, sales and other uses.

V:Tools includes a program simulation tool that reportedly permits users to model video program segments interactively before coding them and a color graphics program for use with high-resolution displays.

The software package also features a variety of utilities for file management, zone creation and system configuration. A palette creation utility permits users to chose a 16-color palette from a choice of 4,096 colors, Visage said.

V:Tools will be bundled with V:Stations beginning in October and will run under V:Exec 2.5, the V:Station's systems software, Visage said. The development software will also be made available to current V:Station users at a cost of between $200 and $300, Visage said.

Also introduced were an upper end to the V:Station line, the V:Station 2080, and the V:Link 1580 upgrade package for use in converting a machine in the IBM Personal Computer line into a videodisk controller.

The V:Station 2080 is based on a personal computer that is said to be compatible with the IBM Personal Computer AT and includes a monitor, system software, a videodisk player and a choice of authoring languages and input options.

Both the V:Station 2080, priced from $9,000 to $15,000 depending on options, and the V:Link 1580 upgrade packages, costing from $3,500 to $6,000, will be available in October and will support high-resolution, 640- by 400-pixel graphics, Visage said.

At the same time, Visage announced support for still-frame audio products from both Laserdata, Inc. and Eeco, Inc. that reportedly permit users to incorporate segments of continuing audio and "frozen" video in the programs they develop on V:Stations.

Products to create still-frame audio program segments are available currently from both vendors, Visage said.

Visage is located at 12 Michigan Ave., Natick, Mass. 01760.

Iomega rolls out storage systems

ROY, Utah — Iomega Corp. has introduced a line of half-height storage systems for use with the IBM Personal Computer line and compatible machines.

All of the products use the technology pioneered by Iomega in its Bernoulli Box line, which uses a pressurized stream of air to spin the disk media. The technology reportedly prevents head crashes. The products are offered in 10M-byte and 20M-byte capacities and single- or dual-drive configurations, Iomega said. Like the original Bernoulli Box, the products use removable media. Iomega said that 20M-byte cartridges will be made available for the new 20M-byte drives only. The Bernoulli Box itself uses 10M-byte cartridges.

A single-drive unit reportedly measures 6.32 in. high by 12.5 in. wide by 15.25 in. deep, or roughly half the size of the Bernoulli Box.

The 10M-byte Bernoulli 10 (B), a single drive, costs $2,695. The 20M-byte Bernoulli 10+10, a dual drive, is priced at $3,695. The 20M-byte Bernoulli 20 (B), a single drive, is $3,295. The 40M-byte Bernoulli 20+20, a dual drive, is $4,495.

More information is available from Iomega, 1821 4000 South St., Roy, Utah 84067.

Datacopy offers Fastore archiving tool

MOUNTAIN VIEW, Calif. — Datacopy Corp. here has introduced a high-speed image scanning and storage device designed for use in digitizing and electronically storing documents.

The Fastore system reportedly will permit the archiving of historical documents, engineering drawings, maps, handwritten forms and other papers.

The unit incorporates Datacopy's Electronic Digitizing Camera and display system and runs in conjunction with a host IBM Personal Computer XT or AT, which is not included in the price of Fastore.

The system can scan a document page in less than three seconds, according to Datacopy.

Once scanned, the document is compressed. A document page of up to 11 in. by 22 in. requires 50K to 100K bytes of storage, Datacopy said.

The digitized documents are stored on the host's hard disk, and the hard disk can be backed up, permitting extensive archivals. The Smithsonian Institution reportedly uses Fastore to archive its document library.

Images captured and stored by Fastore can be displayed at high resolutions, Datacopy said. A resolution of 200 dot/in. is achieved when an 8½- by 11-in. document is displayed using Fastore.

The host Personal Computer can be used to annotate document files and pages. The text annotations can, like the rest of a file, later be searched on the basis of keywords, authors and document names.

Fastore, which also includes a high-resolution display and controller and software, is priced at $44,500. It uses the Priam Corp. Datatower mass storage system, which is not included.

The Datatower units come in two versions — a 160M-byte unit priced at $9,995 and a 290M-byte unit that costs $12,995.

Datacopy is located at 1215 Terra Bella Ave., Mountain View, Calif. 94043.

GTE starts home micro call service

RESTON, Va. — GTE Telenet Communications Corp. has announced a service under which home users of personal computers will be able to pay a flat fee of $25 per month to use the Telenet packet-switched public data network to call other personal computers anywhere in the U.S.

PC Pursuit reportedly will permit users to conduct real-time communications, including file sharing, with other personal computer users or electronic bulletin boards, GTE Telenet said. However, it will be available for use only during evenings and on weekends and, at present, only in certain cities. These include Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, San Francisco and Washington, D.C.

PC Pursuit reportedly will permit users to call any modem's telephone number, including those of nonsubscribers, as long as the modem being called is in any city served by PC Pursuit. PC Pursuit does not support 2,400 bit/sec. modems or spoken communication.

GTE Telenet said the service, which requires users to have their own modems and software for asynchronous communications, could save them up to 75% of their current long-distance charges. Users will dial their local Telenet access number and enter their home phone number and a destination phone number to access the service. If the user's home phone number is valid, they will be called back and connected to the number they were trying to reach, GTE Telenet said.

GTE Telenet is located at 12490 Sunrise Valley Drive, Reston, Va. 22096.

Meet to feature DBMS display

DEKALB, Ill. — Next month's Entity-Relationship Conference in Chicago will feature a micro data base management software competition in which a small number of vendors will demonstrate how their products handle a case study involving personnel data.

Attendees will be able to see inexpensively a large portion of a project life cycle beginning with data base specifications, according to session chairman Rodney Zimmerman. Specifications will be written in terms of entity-relationship diagrams, a graphics documentation technique that is rapidly spreading among Fortune 500 data base professionals, he added. The session will compare solutions in terms of several factors.

The session is scheduled for 7:30 p.m. on Oct. 29 at the Chicago O'Hare Airport Hyatt Hotel.

More information is available from Kathi Davis, Computer Science Department, Northern Illinois University, DeKalb, Ill. 60115.

SPECIAL REPORT

Minis and Small Business Systems

September 30

The September 30th Special Report will take a close look at the minicomputer and small business systems market. We'll discuss the latest trends in minicomputer architectures and examine the evolving supermini market. And we'll cover what's happening in the supermicro market and how it's affecting the mini market. We'll include reports from users on the problems that they encounter in selecting and implementing minicomputer systems and the solutions they discovered.

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Previous software designs have been developed to better utilize the power of the computer.

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It is this capacity, present now in the Masterpiece Intelligent Architecture design, that lifts Masterpiece beyond the promise of other software products in its class.

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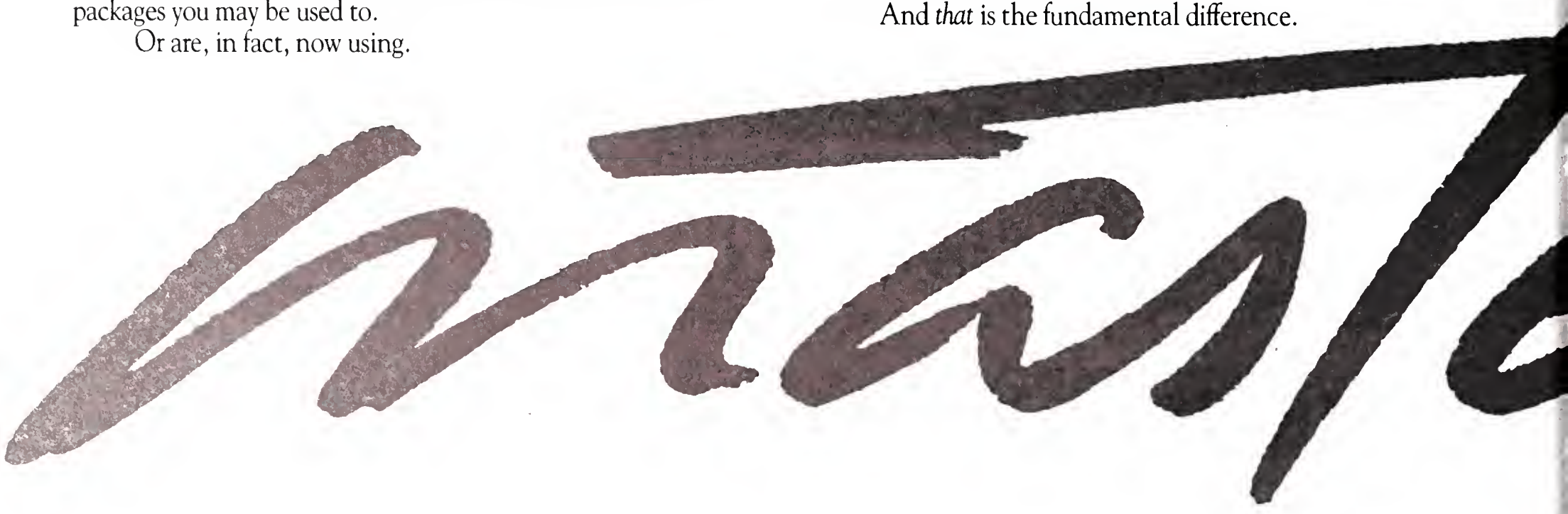

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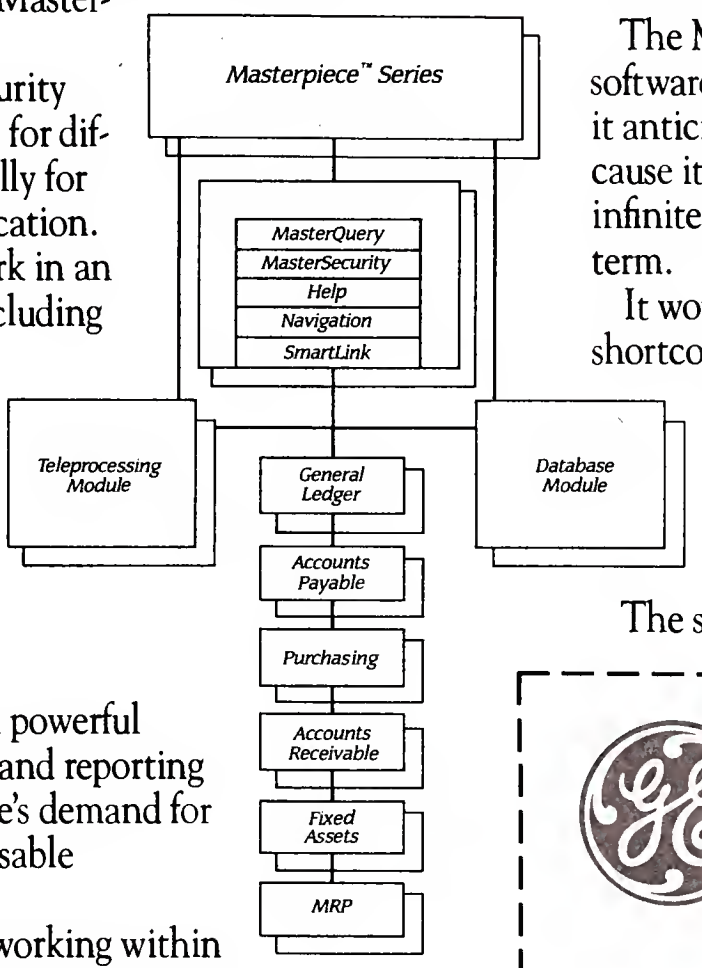

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SOFTWARE

■ United Software Security, Inc. has added a backup program to its product line.

Taketwo backs up hard disk data stored on an IBM Personal Computer XT or AT. The product copies only those files that have been added or changed during a day rather than copying all data on a hard disk, according to the vendor.

The package supplies security features for access and control of backed up files.

Taketwo sells for $1,400.

United Software Security, 6867 Elm St., McLean, Va. 22101.

■ Zedcor, Inc. has enhanced ZBasic 3, a programming language that runs on the IBM Personal Computer line, on Apple Computer, Inc.'s Apple IIe, Apple IIc and Macintosh and on microcomputers with Digital Research, Inc.'s CP/M operating system 2.2 or higher.

The language uses the same commands regardless of the type of microcomputer. The programming language features device-independent graphics, up to 54-digit numeric accuracy, a built-in interactive editor, a compiler and a choice of alphanumeric labels or line numbers.

Zbasic works at speeds up to 50% faster than other programming languages, according to the vendor.

The package costs $89.95.

Zedcor, 3438 N. Country Club, Tuscon, Ariz. 85716.

■ California Computer Products, Inc. has introduced Cadvance, a computer-aided design package for use on a IBM Personal Computer XT or AT using a graphics display board and a minimum of 512K bytes of random-access memory.

Cadvance reportedly employs variable interpretive macros to save time in repetitive design. It also offers nested commands, which reduce the number of times a user must switch between menu selections, the vendor said.

The software reportedly offers the capability to zoom in or out, window and pan short, long or by page without leaving the draw command. While in the draw command, the user can change grids, move or float grids, view a fit and do other functions, according to the vendor.

Cadvance is priced at $2,500.

Calcomp, 2411 W. La Palma Ave., Anaheim, Calif. 92801.

■ David L. Aldridge Co. has introduced Precursor, indexing software for the hard disks of the IBM Personal Computer XT and compatible machines.

Precursor reportedly eliminates the need to remember DOS commands when accessing programs on a hard disk. The package, which resides in 50K bytes of memory, presents users with an index of applications on the disk and permits users to call up applications by pressing one key, the vendor said.

Included in the software are printer setup selections and three levels of password protection.

Precursor is priced at $69.

David L. Aldridge, 341 Town & Country Village, Houston, Texas 77024.

■ Network Software Associates, Inc. has introduced Adaptsna Remote Job Entry/Automatic Processing Facility (RJE/APF) software for use with the IBM Personal Computer.

Adaptsna RJE/APF reportedly permits automatic, on-the-fly postprocessing and reformatting of data transmitted from a mainframe to a Personal Computer.

It also is said to allow a remote Personal Computer to function as an intelligent RJE workstation on which users can automatically determine how to reformat or modify downloaded mainframe data.

The software is priced at $870, the vendor said.

Network Software Associates, 19491 Sierra Soto, Irvine, Calif. 92715.

See **TOOLS** page 61

Package enables Modula-2 users to access Lotus 1-2-3

HOUSTON — Interface Technologies Corp. earlier this month introduced M2access, a $49 package designed for Modula-2 programmers that permits them to read and access Lotus Development Corp. 1-2-3 files directly.

IBM Personal Computer users who work with the Modula-2 language now can access 1-2-3 files without having to construct macros and without having to run under the 1-2-3 spreadsheet, according to Interface Technologies' President Robert Warfield.

"People can write add-on programs to 1-2-3 to do custom report generation, file manipulation and improved business graphics," Warfield said.

In addition to being available as a stand-alone product, M2access will be bundled in with sales of the company's M2SDS-XP software development system or Modula-2 Extended Libraries software until Sept. 30, the vendor said.

More information on M2access is available from Interface Technologies, which is located in Suite 200, 3336 Richmond Ave., Houston, Texas 77098.

MICROCOMPUTERS

TOOLS from page 60

■ **The Institute for Scientific Analysis, Inc. has introduced Small-X, an interpreter program for use in artificial intelligence programming on the IBM Personal Computer.**

Small-X reportedly includes a programming language that combines a simple syntax with the tests and actions needed for the development of rule-based expert systems. It includes the ability to control and exchange data with other Microsoft Corp. MS-DOS-based applications, the vendor said.

The software requires 128K bytes of memory and costs $249. A manual, several example expert systems and a demonstration script are included.

Institute for Scientific Analysis, Suite 106A, 36 E. Baltimore Pike, Media, Pa. 19063.

■ **Financial Decision Systems, Inc. has announced an enhanced version of its Corptax Linx tax reporting software for the IBM Personal Computer, Personal Computer XT and Personal Computer AT.**

Version 2 reportedly allows users to customize reports in single-column, multicolumn and book-to-tax trial balance forms. It includes additional capabilities for consolidations, deletions and disk management and also includes the ability to convert data into general ledger format.

Version 2 requires a hard disk, a minimum of 512K bytes of random-access memory and a printer.

Cost of the software is $2,000. Users of Corptax Linx Version 1 may upgrade for $350.

Financial Decision Systems, 28035 Dorothy Drive, Agoura, Calif. 91301.

■ **BST Consultants, Inc. has announced that its Management Information System software for professional design firms and other project-oriented firms is available on Digital Equipment Corp.'s Microvax II running under DEC's MicroVMS operating system and on the IBM Personal Computer AT running under Microsoft Corp.'s MS-DOS operating system.**

The system is said to combine functional and organizational accounting and financial management in a multiuser integrated package. The functions include project control, billing, payroll and general accounting functions.

The system costs $12,500 for the Personal Computer AT version and $20,000 for the Microvax II version.

BST Consultants, P.O. Box 23425, Gunn Highway, Tampa, Fla. 33623.

■ **Infocode, Inc. has introduced Infolok security software for the IBM Personal Computer and compatibles.**

Infolok reportedly encrypts data using a passkey of up to 64 characters. Its functions include encryption and decryption, file purging, teleformatting and file hiding and finding.

Teleformatting capability is said to allow the software to convert a standard or encrypted file into transmittable Ascii format and to encrypt and transmit simultaneously using a single command.

Infolok is priced at $149.

Infocode, 19 Union Square W., New York, N.Y. 10003.

■ **California Software Products, Inc. has introduced its Backrest software option for its Baby/34 and Baby/36 software products, which emulate the IBM System/34 and System/36, respectively, on the IBM Personal Computer.**

Backrest, a software module, reportedly uses an incremental backup feature that indicates changes made to data during a specific period and backs up only the changes. The package also has an automatic formatting feature and indicates how many diskettes are needed for the backup.

Backrest is priced at $300 for Baby/34 and Baby/36 customers. It will also be sold as a stand-alone product for $350.

California Software Products, Suite 300, 525 N. Cabrillo Park Drive, Santa Ana, Calif. 92701.

■ **Decision Resources, Inc. has introduced Diagram-Master software for the production of diagrams on the IBM Personal Computer.**

Diagram-Master reportedly is a prompt-driven application able to produce organizational and Gantt charts as well as custom free-form diagrams, such as flow charts. A vector graphics package, the software interfaces with a variety of output devices including pen plotters, printers and the Polaroid Corp. Palette 35mm slidemaker.

When creating an organizational chart, users reportedly can include up to 70 boxes with up to six lines of text per box.

Diagram-Master is priced at $345.

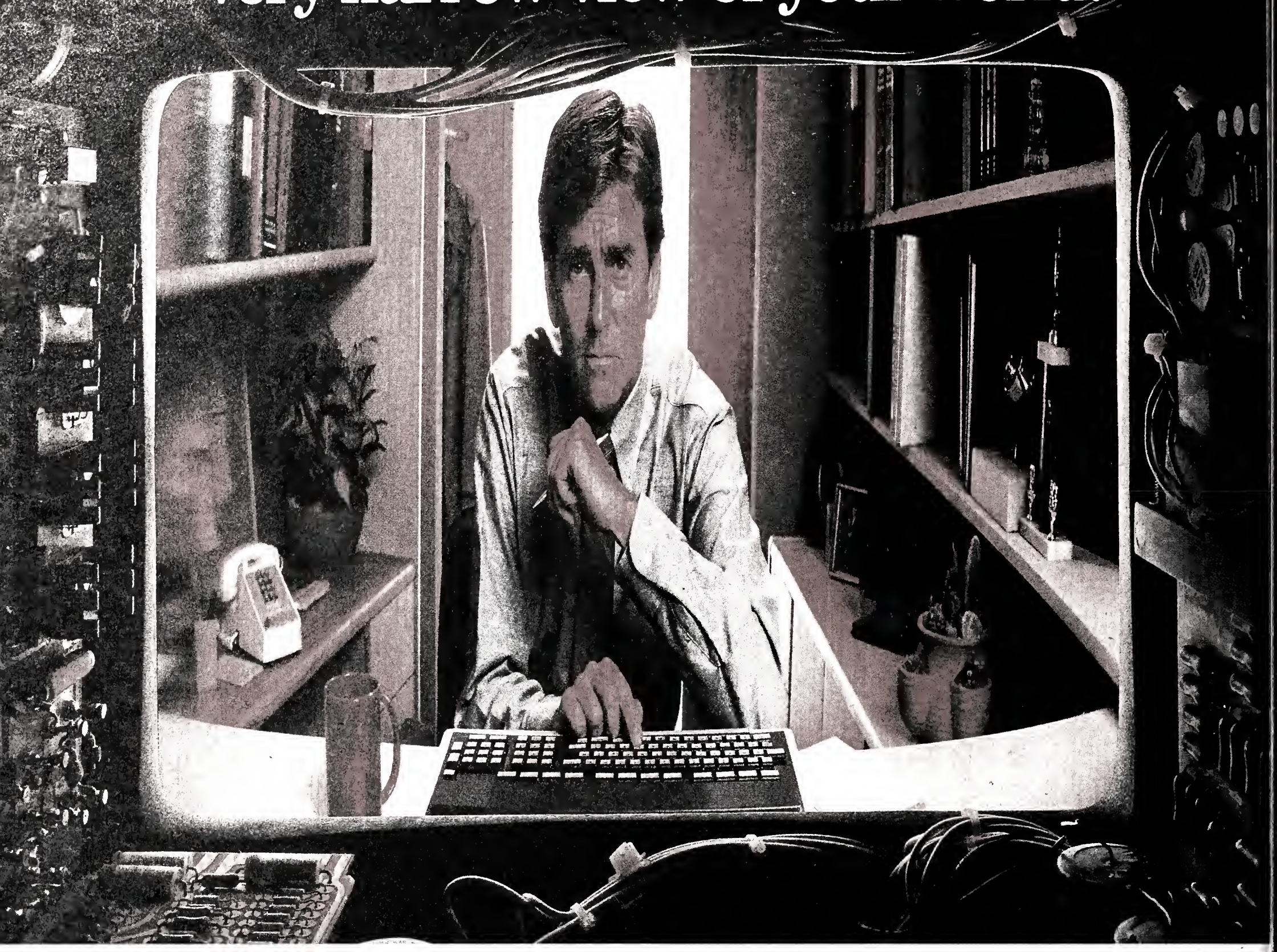
Decision Resources, 25 Sylvan Road S., Westport, Conn. 06880.

■ **Rand McNally Infomap, Inc. has introduced Randmap mapping software for the IBM Personal Compnter.**

Randmap reportedly permits maps to be created by state, county, Standard Metropolitan Statistical Area, three- and five-digit Zip code areas, congressional districts and other means. The package also features

Continued on page 63

Ordinary computer systems take a very narrow view of your world.



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Sperry Corporation, Computer Systems, Box 500, Blue Bell, PA 19424-0024

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SPERRY

MICROCOMPUTERS

DSS from page 55

to large companies, which account for at least three-quarters of Lightyear shipments but take a long time in evaluation.

Financing the Santa Clara, Calif., start-up brought other problems. Last summer, Lightyear tried to tap venture capital, but "the market was just absolutely atrocious for raising capital, as it still is," Garnett said. Interested venture capitalists typically wanted Lightyear to merge with another software firm, which Garnett thinks would have wasted time.

The firm raised more than a million dollars privately, got the product out the door, hit a break-even point in January and has been marginally profitable ever since. While it was in no danger of closing its doors, the principles did worry about Lightyear's vulnerability to a few months of bad sales.

Snags cropped up

Snags in distribution also cropped up. "The distribution channel may be turned off right now," with distributors and dealers accustomed to products selling in large quantities, Garnett commented.

Dealer sales personnel may have little incentive to push new packages because customers often end up placing their volume orders with wholesalers. "We did everything we could to keep it out of the gray market," Garnett said. But there's a catch-22 involved because vendors seek to make their products widely available.

Through the first half of this year, Lightyear continued to examine options for raising bucks to continue the struggle.

Two months ago at a Future Computing, Inc. conference, I asked Garnett and Thoughtware, Inc. President Jack Levine an industry-standard question — are you guys buying anyone, or is anyone buying you?

There was no need for acquisitions from a product point of view, because "you can license anything you want," Levine said. But Garnett remarked that "there's so much chaos in the market now, everyone's talking to everyone."

In fact, the two began talking at the conference, and earlier this month they announced plans for Miami-based Thoughtware to acquire Lightyear.

Thoughtware's Trigger management package faces many of the same obstacles as Lightyear, Garnett said, and "it's a very good merger for both sides."

Continued from page 61

dot-density mapping and the ability to specify map boundary colors and text colors, according to Rand McNally Infomap.

Eight color boards, 11 plotters and eight mice are supported, Rand McNally Infomap said.

Randmap is priced at $995, according to the vendor.

Rand McNally Infomap, P.O. Box 7600, Chicago, Ill. 60680.

■ **Pelton Engineering Ltd. has announced computer-aided design and drafting software for the IBM Personal Computer, Personal Computer XT and Personal Computer AT.**

Ecad is said to feature cursor-driven panning and instant zooms, regardless of the complexity of the drawing. Line thickness and patterns are displayed on the screen as they are on the plotted drawing. The software reportedly sorts and plots the lines of each thickness consecutively.

The software requires a minimum of 640K bytes of memory, an Intel Corp. 8087 math coprocessor, a Hercules Computer Technology, Inc. Monochrome Graphics Card, a Houston Instruments DMP series plotter and the IBM PC-DOS operating system.

The cost of Ecad is $2,195.

Pelton Engineering, 3991 Smuggler's Cove Road, Victoria, B.C., Canada V8N 4M1.

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DATA STREAM
John Dix
CW Senior Editor

AT&T's reign spurs mergers

AT&T, formerly Ma Bell, probably took some lessons from Mother Nature. You can't mess with either.

At least, you can't do it alone.

The largest fly in the ointment, MCI Communications Corp., conceded this fact recently when it flew into the arms of IBM. While that agreement is significant given the importance of the companies involved, it is neither the first sign of industry maneuvering nor the latest in the turbulent long-distance telecommunications market.

It all began in late 1982 when GTE Corp., the second largest telephone company before AT&T's divestiture, moved to acquire Sprint from Southern Pacific Railroad.

It was a bold move by the local service supplier to enter the long-haul business.

Little more than a year later, United Telecommunications, Inc., the third largest telephone company before divestiture, acquired U.S. Telecom, one of the industry's largest resellers.

The MCI/IBM deal is recent history. IBM sold Satellite Business Systems to MCI in exchange for a 16% interest in the discount long-distance company.

And, most recently, Allnet Communications Services, Inc. joined forces with Lexitel Corp. Allnet is a Chicago-based carrier that operates a nationwide network, and Lexitel is a regional carrier based in Birmingham, Mich.

The impetus for the mergers and acquisitions is different in each case. As the second and third largest tele-

See **MERGER** page 66

Financial analysis for the communications manager

FIRST IN A THREE-PART SERIES

By Daniel Minoli
Special to CW‡

Communications managers increasingly are being confronted with financial decisions regarding the capital equipment needed to run an efficient and up-to-date network. Even when managers restrict themselves to technical issues and delegate financial questions to experts, they still need to understand why a particular choice was recommended over another.

In a three-part series, this column will outline the basic concepts of financial analysis that are likely to apply to data communications and to capital equipment — asset — acquisition. The first two parts will define and explain commonly used terms. The third section will outline actual decision methodologies.

Two examples will guide the development: Should the manager buy a piece of gear for $2,000 or lease it for $80 a month? Should the manager buy a piece of gear for $2,000 with a maintenance fee of $100 per month or buy another model that costs $3,000 and has a maintenance fee of $50 per month?

Minoli is an associate vice-president, systems planning and engineering, of Prudential-Bache Securities, Inc. in New York.

Basic concepts

Basic terms that communications managers should be familiar with include the following:

- Capital asset. A physical asset used by a firm in producing goods or services.
- Capital budget. A statement of the firm's planned investments, generally based upon estimates of future sales, pro-

See **FINANCE** page 66

- Codenoll Technology has added a switch-selectable fiber-optic Ethernet transceiver/**66**
- Aviv has announced an 8-line asynchronous communications multiplexer for Digital Equipment Q-bus processors/**66**

INSIDE

Multiplexers/Modems/**66**
Local-Area Networks/**66**
Auxiliary Equipment/**66**

Quadram unveils micro link

ROSWELL, Ga. — Quadram Corp. has announced the Quad3278 Gateway, providing a communications link between micros in a local-area net and their IBM Systems Network Architecture (SNA) hosts.

The Quad3278 Gateway provides communications support for SNA Physical Unit Type 2 and Logical Unit Types 1, 2 and 3 sessions and services. The product emulates an IBM 3274-51C/61C communications controller and emulates IBM's 3278 Model 2 and four-color 3279 displays as well as an IBM 3287 printer.

The Quad3278 Gateway is capable of 9.6K bit/sec. synchronous host communications. The product features 512K bytes of main memory and National Semiconductor Corp.'s 32016 microprocessor set.

The product can support up to 32 concurrent users while the host continues computing. Other features include session control options such as multiple concurrent IBM SNA host sessions, user-controlled session switching, printer sharing, host-initiated printing and disk logging. A session-hold option permits the user to switch from a host session to the microcomputer operating system and back.

The Quad3278 Gateway also includes on-board parity checking of memory, an RS-232C modem connection, power-up diagnostics resident in read-only memory and downloading of Quad3278 Gateway software from any local-area network-based hard disk or diskette.

The Quad3278 Gateway costs $6,000.

Quadram, 1009 Mansell Road, Roswell, Ga. 30076.

Bridge offers video modems for CATV broadband nets

BEDFORD, Texas — Bridge Communications, Inc. has announced intelligent video modems that enable users to add video capabilities to CATV-type broadband local-area networks.

The 8433 Video Modulator and 8432 Video Demodulator handle video teleconferencing, video surveillance, closed-circuit instructional television, TV distribution and remote factory process monitoring, a spokesman said. The products are based on an Intel Corp. 8051 microprocessor.

The 8433 and 8432 can be installed in new broadband networks or in existing CATV plants used previously for only data communications.

An RS-232 port is provided for control of remote devices.

The modulator can be tuned in 250-KHz steps to any frequency between 50 and 300 MHz, and the demodulator can be tuned to any frequency between 50 and 440 MHz. Other features include a separate nine-pin connector for audio signals, selectable CATV tuning scheme, selectable automatic fine tuning and a front-panel, 4-char. LED display indicating the channel selected and other parameters.

Both units reportedly are compatible with U.S. National TV Standards Commitee video standards.

The 8433 Video Modulator is priced at $1,795, and the 8432 Video Demodulator is priced at $1,495, the company said.

Bridge, R. F. Products Division, 2001 Reliance Pkwy., Bedford, Texas 76021.

Racal-Vadic enhances modem, unveils controller

MILPITAS, Calif. — Racal-Vadic, Inc. has announced that it has added Microcom MNP error-control and speed-conversion features to its 2400PA modem. The company also announced the 855M, a stand-alone error controller that supports MNP.

Both the 2400PA and 855M are said to increase throughput by converting data from asynchronous to synchronous format. The model adapts its transmission speed to the fixed speed of data terminal equipment. The modem can operate at dial-up speeds of 300, 1,200 and 2,400 bit/sec.

A flow control feature prevents data terminal equipment from overloading the modem with data. The 2400PA offers a Modem Manager and memory editor feature, said to allow remote management and maintenance from a single location. Network managers can access and set configuration options, update and store access numbers and logon passwords and redirect call-ins when a computer goes down.

An automatic logon feature in the 2400PA allows a user to log on with a single command.

Other features include RS-232 terminal interface compatibility, operation in either synchronous or asynchronous mode, tone or pulse dialing, call-progress detection, security password to prevent unauthorized access to memory contents and user diagnostics.

The 2400PA is priced at $795. The 855M is priced at $295.

For additional information, Racal-Vadic is located at 1525 McCarthy Blvd., Milpitas, Calif. 95035.

COMMUNICATIONS

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duction needs and availability of capital.

■ Depreciation. A deduction of part of the cost of an asset from the company's income in each year of the asset's life. Some typical, and minimal, depreciation intervals are five years for modems, personal computers and other pieces of small equipment; and seven years for front-end processors, private branch exchanges and other pieces of large equipment.

Recently an accelerated depreciation schedule became law that allows firms to depreciate a piece of equipment fully well before the end of its useful life. The motivation was to fend off foreign competition by permitting some segments of the manufacturing industry to retire older but still functioning equipment in favor of newer, more efficient and automated equipment.

■ Investment Tax Credit (ITC). An income tax credit is given to firms for investing in plant and equipment. It ranges between 7% and 10% of the face value of the investment. This is generally considered as a reduction of the initial equipment cost.

The proposed tax simplification legislation currently being discussed would do away with ITC. This would hurt small to medium-size firms in regard to upgrading their equipment.

■ Cash flow. This is the actual dollars coming to the firm or paid by the firm as a result of adopting an investment. In other words, it is the difference between the cash income generated by the project — new sales, products, benefits and the like — and the necessary expenditures — equipment costs, labor and the like.

■ Amortization. A sinking fund established for settling debt-financed assets; writing off expenditures by prorating them over a fixed period of time.

■ Cost of capital. The interest rate being charged to secure a loan to finance a given project, for example, the prime rate or the average rate on the securities (bonds and stocks) issued by the company. This represents the minimum acceptable rate of return on an investment or project undertaken by the company.

■ Principal. The amount of money on which interest is paid by the borrower. It decreases according to the amortization schedule.

■ Interest. Same as the cost of capital. Interest can be demanded as simple interest or compounded interest. In the former case, the borrowing charge is a linear function of the initial loan; in the latter case, the charge is an exponential function of the original loan. Compounding always makes the amount due larger than under the simple interest case. In business, compounding is the norm.

All these factors come into play in the decision of how to compare alternate strategies for capital equipment acquisitions listed above.

However, more background is required before we can find the answers to the two problems presented above. This will be done in next week's column.

MULTIPLEXERS/ MODEMS

■ **Datacom Northwest, Inc. has added a synchronous short-haul modem to their product line that complements their asynchronous model.**

Selectable data speeds range from 1,200 bit/sec. to 19.2K bit/sec. Features include analog and digital loopback, transmit and receive LED indicators and optical couplers.

The unit is available in 110V or 220V configurations and is priced at $159.

Datacom Northwest, S.W. Building 100, 3303 112th St., Everett, Wash. 98204.

■ **Aviv Corp. has unveiled the Model CC 900 8-line asynchronous communication multiplexer for Digital Equipment Corp. Q-bus processors.**

The product is based on Webster Computer Corp.'s 8-channel SDZV11 multiplexer. The companies have reached an agreement that gives Aviv manufacturing rights to the Webster multiplexer. The Model CC 900 is functionally compatible with DEC's DZ11 or DZV11 multiplexers.

The CC 900 features line programmable transmission rates, character length, parity, stop bits and transmitter enable. Two tables of 16 transmission rates each are provided, permitting access to faster rates of 19.2K bit/sec and 38.4K bit/sec.

The Model CC 900 costs $995.

Aviv, 26 Cummings Park, Woburn, Mass. 01801.

LOCAL-AREA NETWORKS

■ **Codenoll Technology Corp. has announced a switch-selectable fiber-optic Ethernet transceiver.**

The $795 Codnet-3030S can be switched to meet the interface requirements for IEEE 802.3 standards and Ethernet Version 1 and 2 equipment, the vendor said.

A user can choose from various options like ac or dc coupling and interfaces with or without self-diagnostic capabilities for standard operation or use with remote repeaters.

Codenoll Technology, 1086 N. Broadway, Yonkers, N.Y. 10701.

■ **AST Research, Inc. has introduced the AST-Netbios Option software program for its local-area networks, said to provide compatibility with software written for the IBM Personal Computer Network Adapter.**

AST's PCnet and PCnet II networking hardware emulates IBM's Network Basic I/O System (Netbios) when running the AST-Netbios Option. This enables AST to take advantage of standard IBM network applications software, a spokesman said. Netbios functions as an interface between a local network and an operating system.

The AST-Netbios Option provides support for the IBM Personal Computer Network Program. It will be available in September at a price of $195 per node.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

AUXILIARY EQUIPMENT

■ **Encom Corp. has added an enhanced Network Control System to its product line of management tools for complex data networks ranging in size from four to 4,096 lines at speeds to 64K bit/sec.**

NCS70/30 is said to provide real-time error and status message reports.

Response time, line utilization and activity, error and status reports are presented by a local control terminal and system printer.

The system costs $75,000.

Encom, Suite 901, 101 E. Park Blvd., Plano, Texas 75074.

MERGER from page 65

phone companies providing local services in the U.S., it was natural for GTE and United Telecom to venture into the long-haul market.

GTE bought a healthy company in Sprint, second only to MCI in competition with AT&T for long-distance service. United Telecom went another route, preying on what appeared to be an early casualty of divestiture. As a reseller, U.S. Telecom was eking out its living by buying bulk services from AT&T and reselling them at competitive prices.

Resellers operate on very slim margins by necessity, and the uncertainty of AT&T rates at the time of divestiture and pending access charges had all resellers — and their customers — on tenterhooks. Business was suffering, and U.S. Telecom was looking for a white knight.

MCI sought the IBM deal because it needed the deep pockets of the mainframe maker to fund its network expansion. MCI couldn't capture new customers without the new facilities and would have had problems funding the facilities without the new customer revenue.

The most recent allegiance, the Allnet/Lexitel merger, was triggered by the financial difficulty Allnet was experiencing and the fact that the companies were synergistic.

Driving all this merging, shuffling and posturing is AT&T's stranglehold on the long-distance telecommunications market. While talk of competition is rampant, AT&T still controls an estimated 90% of the industry.

And yet, by rough count, there are still over 500 long-distance carriers in the business today, according to Anne Frances Bleecker of the Competitive Telecommunications Association in Washington, D.C. Other than the companies mentioned, most all of the remaining carriers — with the notable exception of Western Union Corp. — are resellers.

Read their last rites in 1983, this tenacious group of companies has been somewhat revived by the long-distance fiber-optic carriers. These networks have created a glut of long-haul capacity and have given the resellers an option that is less expensive than leasing AT&T facilities.

The reseller shakeout, however, is inevitable, leaving perhaps a few dozen companies in its wake. Mergers, acquistions and filings under Chapter 11 of the Federal Bankruptcy Act will prevail. No industry sector, it appears, can stand alone against the AT&T tide.

SYSTEMS & PERIPHERALS

Disk cache option out

WALTHAM, Mass. — Honeywell, Inc. has announced a hardware-based disk cache processing option. The option — available to users of the company's 16-bit DPS 6/75 and 32-bit DPS 6/95 minicomputers — is said to offer improvements in system efficiency, terminal response time and terminal connectivity.

The system manages disk caching on a global basis instead of assigning a disk cache buffer to individual disk controllers, a spokesman said. Increases in actual performance with the disk cache processor depend upon the specific customer environment. To determine if and by how much the option may benefit the user, Honeywell technical field staff members use a DPS 6 system monitor.

The disk cache processor can be field installed in existing systems or ordered as an option on new systems. On the DPS 6/75, the processor price, with 2M bytes of cache buffer memory, is $18,000 if factory installed and $22,000 if field installed. Additional cache buffer memory, in increments of 2M bytes, can be added for $10,000 each, up to a maximum of 6M bytes.

On the DPS 6/95, the disk cache processor price is $12,000 at the factory and $16,000 if field installed. DPS 6/95 users must allocate at least 2M bytes of system main memory for the disk cache buffer. The system can support up to 14M bytes of disk cache buffer memory.

Honeywell is located at 200 Smith St., Waltham, Mass. 02154.

Wang offers more power for mid-range VS units

Extra configurations added for up to 80 users

By Donna Raimondi
CW Staff

LOWELL, Mass. — Wang Laboratories, Inc. has announced increases in power and configuration options for its mid-range VS computers.

Main memory capacity has been doubled to 8M bytes for the VS 85 and to 16M bytes for the VS 100 system. The VS 85 can now be ordered in 2M-, 4M- and 8M-byte versions, and cache memory is standard at each level. The VS 100 comes in 2M-, 4M-, 8M-, 12M- and 16M-byte models. Existing 4M-byte VS 85 and 8M-byte VS 100 systems can be field upgraded in 4M-byte increments to the maximum configurations. Each step of 4M bytes costs $32,000.

The company has announced an increase in the number of terminals that can be connected to the VS 65 and VS 85 systems. The VS 65 now has a maximum configuration of 40 workstations; the VS 85 can support a maximum of 80 workstations.

Enhancements in configuration include the Wangnet Peripheral Band, which allows both local direct attachment and remote attachment of workstations and other devices to the VS 15/65 and the VS 300. The modular serial I/O systems were previously available for the other systems in the VS series. The cost per connection starts at $121 for VS 15 or VS 65 installations and runs up to $182 for VS 300 systems.

A 32-port serial device I/O processor for the VS 85 and VS 100 is said to double the number of physical ports per I/O processor slot. The processor supports up to 32 VS serial ports and a total of 32 logical devices. It costs $5,000.

Also announced was the ability for VS 85 and VS 100 users to add the VS-6550 telecommunications processor. The processor is said to provide all telecommunications support circuitry and 128K bytes of memory. It supports communications in a number of networks including Wang Systems Networking, IBM's Systems Network Architecture and the X.25 protocol. The VS-6550 costs $2,200.

Newly packaged configurations include a VS 65-A package that has a VS 65 CPU with 1M byte of main memory, 16K bytes of cache memory, a 147M-byte internal disk and a small data storage cabinet offering an additional 223M bytes of storage — a 147M-byte fixed disk and a 76M-byte removable disk. The system costs $47,680.

Three VS 85 and VS 100 packages have been announced — basic hardware packages, office automation packages and data processing development packages. The hardware packages add some basic Wang Office functions to become the OA packages. The inclusion of Wang's Professional Application Creation Environment data base management software, a Cobol com-

See **WANG** page 74

- Computer Automation released a line of distributed DP systems that previously were only available in Europe/**70**
- Ampex announced DEC VT220 and VT100 look-alikes/**70**
- Xerox unveiled the Advantage D80 letter-quality printer/**71**

INSIDE

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Sequent rolls out enhancements for Balance 8000

PORTLAND, Ore. — A series of enhancements to the Sequent Computer Systems, Inc.'s Balance 8000 parallel processing system has been announced.

The Balance 8000 — announced in September — is a 32-bit parallel processing system that incorporates from two to 12 National Semiconductor Corp. microprocessors under Dynix, Sequent's version of AT&T's Unix 4.2 operating system.

An Atomic Lock Memory (ALM) enhancement, which is an add-on set of chips to the computer's multibus adapter board, is said to support 16,000 hardware locks per board, with up to four boards per system. The microsecond locking speeds of the ALM are said to support fine grain parallel programming by decreasing synchronization overhead. The ALM costs $1,000 as an upgrade for existing customers but will be standard on future machines.

A new software library is said to offer a formal, secure way to share memory among processors by adding support for dynamic allocation and reallocation of shared memory regions. A newly announced parallel programming library enables application developers to use shared memory and fast lock features through standard language library call mechanisms. It includes routines that allocate and deallocate shared memory resources and includes program synchronization primitives. There is no charge to existing customers for any of the software enhancements, the company said.

The company also announced it is replacing all of the National Semi 32016 processors in the system with the National Semi 32020 CPUs. All new machines will have the 32020s, and all existing user machines will be field upgraded at no charge.

Information can be obtained from Sequent Computer Systems, 14360 N.W. Science Park Drive, Portland, Ore. 97229.

Software Notes®
News for the DP professional

PHOTO MARK GODFREY—ARCHIVE PICTURES

Rail car leasing is just one of the financial services supported by the GE Credit Corp. network. IBM's Information/Management helps GECC identify network problems fast.

Information/Management Helps GE Credit Keep Network On Track

"We have happier customers," says Tom Dixon, manager of computing and telecommunication services for General Electric Credit Corporation (GECC) in Stamford, Conn. He is describing the use at GECC of IBM's Information/Management, Version 2—a licensed program that helps manage large data networks.

With assets of $17 billion, GECC is one of the country's largest commercial lenders—active in retail credit, commercial leasing and mortgage banking.

And GECC operates a very large network: one with more than 2,000 terminals. The users, Mr. Dixon's customers, are in GECC field offices, retail stores and GECC client offices. They operate workstations, point-of-sale terminals and credit authorization terminals.

IBM's Information/Management program helps Mr. Dixon's staff use its computer to provide better service to customers. It enables the staff to record and retrieve all the data relevant to any network operating problems: the list of equipment at each site, the details of every communication link, a complete record of every problem occurrence at each site, complete data on every type of equipment used in the network, and a detailed file on each vendor.

These data files can be searched to learn, for example, the history of a particular incident or of all previous occurrences of similar problems.

"We know our customer's environment," Mr. Dixon says. "Over the telephone from GECC's customer support center, we can provide procedures to identify or correct the problem. We can see every change made to the telephone circuit serving that site. We can see all problems on that circuit, year to date. And we can talk to the telephone vendor in specific, geographic terms.

"We're automating ourselves so that our present staff can handle a much larger network and a much greater rate of network change," Mr. Dixon continues. "We're already handling about ten times more devices than two years ago. And we're eliminating paperwork and becoming more responsive.

"Our next step will be to automate the management of network change with Information/Management." ▪

Pacific Northwest Bell Creates Online System Fast

"This is a very large and complex system," says John Osterfeld of Pacific Northwest Bell Telephone Company. "Yet we were able to implement it with 12 programmers—half of them brand-new to programming—in a total of 13 months from preliminary design to an online production system.

"It would have taken at least twice as long without ADF."

Mr. Osterfeld, a system analyst for Pacific Northwest Bell, is referring to IBM's Application Development Facility (ADF). Designed for users of the IMS/VS data base/data communication system, ADF greatly reduces the amount of programming required to create an application.

The programmers, under the technical guidance of Mr. Osterfeld, worked with ADF to develop a new version of the Customer Account Retrieval System (CARS) used by Pacific Northwest Bell representatives to call up account histories while answering customer telephone inquiries.

"We were up against a hard deadline. The application had to replace an older version within 13 months," he continues.

"Fortunately, ADF simplified the IMS programming to the point where we could meet the deadline using some people with no programming experience at all.

"CARS now has several thousand users," Mr. Osterfeld points out, "and a very large data base. In our largest center, CARS handles 350,000 transactions a day—12 per second at peak times. So it is an application with a lot of demand on it. Execution has to be very efficient.

"And this version handles 28 I/O calls per transaction, compared to 20 or less in our previous system.

"In other words, the system as written with ADF is actually more efficient in execution than the conventionally programmed system it replaces." ▪

IBM Software Experts Answer the Call to Keep Systems Running Smoothly

It's 2:00 a.m. You're testing a new application on a tight deadline. Suddenly, something —you don't yet know what— triggers an "abend."

With software, that happens. Each new hardware configuration, new application, or different combination of software releases is a unique environment that may cause a previously hidden problem to surface.

So, to keep IBM intermediate and large system customers up and running, the skills of more than 1,500 software service professionals are always on tap. Part of the IBM National Service Division, these professionals have the full power of special data bases at their fingertips.

You just call a special 800 number. At any time, 24 hours a day, seven days a week, you reach an IBM support center in Chicago, Boulder or Tampa. These locations service IBM's MVS, MVS/XA, DOS/VSE, VM and VS/1 system products and the licensed products associated with them. The centers also service licensed products for the Series/1 and the 8100.

Often the IBM Program Support Representative (PSR) taking the call recognizes the problem and gives the customer a remedy. To help the PSR, IBM maintains a data base of symptoms and solutions for known problems. If the problem requires a revision to the code, the PSR has a Program Temporary Fix (PTF) sent to the customer by the fastest possible method—in some cases, by a telephone link.

Over 50 percent of problems are solved by the PSR. But when a problem is a new one, the customer is put in touch with a program specialist, who often is located near the actual developers of the software product.

On the most severe problems—those which have halted processing—the first goal is to find some remedy, such as a bypass, that allows work to resume. The objective is to complete this within 24 hours.

The second goal for the program specialist is a permanent solution. When this requires a new PTF, the objective is to develop and test it within 14 days. The specialist re-creates the problem, functionally tests the new PTF, and then runs "regression tests" to be sure the fix is reliable.

To close the loop, IBM periodically makes available service updates which combine all recent program changes. ▪

To consult a data base of software symptoms and solutions, IBM representatives at customer sites talk by phone to these specialists at the IBM support center in Chicago.

Cross System Product Set–Version 2 Recently Announced

With the recent announcement of Version 2, the IBM Cross System Product Set becomes a strategic productivity tool for large systems, as well as for intermediate and distributed systems. This application generator includes three licensed programs: one for creating applications, one for executing them and a third that permits end users to query the VSAM or CMS files.

The Cross System Product Set runs under all operating systems for 30XX and 4300 systems and under DPPX/SP in the 8100. With this version, support is added for IMS/VS/DB and DL/1 as data bases for CICS/VS. In addition, it has been enhanced to run in systems with large networks of terminals.

Simplify MVS Installations

The IBM Custom-Built Installation Process Offering (CBIPO) is a simplified packaging of MVS. A CBIPO can cut the time to install an MVS system or subsystem from weeks to days.

Conventionally, a major system change involves a separate tape, documents and installation procedure for each program product.

With CBIPO, you first select the program products you intend to use with MVS. Then, with an automated process, IBM custom-builds an MVS system consisting of the ordered products in the form of distribution data sets.

The CBIPO also includes customized documentation that provides a step-by-step single installation path.

IBM Software for your Business Professionals...

If you're interested in the growing information needs of business professionals, you'll be interested in *IBM Software Notes for the Business Professional and Manager,* an advertisement in recent business publications that featured these products:

- IBM's Query Management Facility (QMF). QMF is part of Dow Corning's end-user computing program. QMF lets employees do ad hoc queries on relational data bases.
- The Information Facility (TIF). Pratt & Whitney manufacturing experts create computer applications quickly, easily and in plain English.
- Info Center/1 is a new functionally integrated decision support product, combining and enhancing three popular IBM products: ADRS, APL/DI, and FPS.
- The IBM Personal Decision Series (PDS) lets PC users perform a variety of tasks on corporate, departmental or personal data bases.

For literature on these products, check "Business Professional Software" in the coupon at the right.

IBM 8-26
DRM
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400 Parson's Pond Drive
Franklin Lakes, NJ 07417

Please send me literature on:
- ☐ Information/Management, Version 2
- ☐ IBM Support Centers
- ☐ ADF
- ☐ Cross System Product Set, Version 2
- ☐ CBIPO
- ☐ Business Professional Software

Name_____

Title_____

Company_____

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State_____ Zip_____

Phone_____

Computer Automation's Syfa System 2 out in U.S.

Distributed DP unit debuted in UK, Europe

DALLAS — Computer Automation, Inc. has released its Syfa System 2 family of distributed data processing systems in the U.S. The hardware and software offerings were announced in the spring in the UK and Europe.

The Syfa System 2 is a direct replacement for previous Syfa systems, which can be field upgraded to the new capabilities, the vendor said. Five multiuser, multifunction transaction processors for high-volume interactive applications are said to provide data entry and inquiry response to both local and remote data bases. Each can be field upgraded to be attached to the company's broadband local-area network bus as a resource processor.

According to Computer Automation, systems include the entry-level 150TP configuration with eight local or remote terminal ports, 128K bytes of random-access memory, 258M bytes of disk storage, 60M bytes of tape cartridge backup and one system printer.

The 170TP is similarly configured but is expandable to 256K bytes of memory and 16 terminal ports, the vendor said.

Another model, the 190TP, reportedly features a 2K-byte cache memory.

The 300TP expands to a 24-port capability, up to 680M bytes of fixed disk storage and up to two system printers.

The 1000TP — the largest Syfa System 2 configuration — is said to support 384K bytes of memory and 1.36G bytes of disk storage. In typical configurations the above models range in price from approximately $23,000 to more than $150,000, the vendor said.

Computer Automation also announced four Syfa System 2 Resource Processors (RP) that function as file servers on the company's shared resource local-area network.

An RP — operating on a Syfanet distributed network architecture — can support 128 individual sessions simultaneously.

Up to 15 RPs can be attached to a single Syfanet network, the vendor said.

The models 170RP, 190/195RP, 300/350RP and 1000/1500RP range in price from approximately $65,000 to more than $350,000.

Additional information can be obtained from Computer Automation, which is headquartered at 1800 Jay Ell Drive, Richardson, Texas 75081.

Microvax II gets EMC cards

NATICK, Mass. — EMC Corp. has announced 2M-byte and 4M-byte add-in memory cards for Digital Equipment Corp.'s Microvax II computer system.

The MVXII-2MB and MVXII-4MB are quad-height cards that reportedly use 256K-byte random-access memory devices. They are said to be compatible with the Microvax II hardware and operating system and to support all memory system features, including diagnostics and parity checking.

The MVXII-2MB costs $2,800, and the MVXII-4MB costs $5,100, the vendor said.

More information is available from EMC, 12 Mercer Road, Natick, Mass. 01760.

DATA STORAGE

■ **Anritsu America, Inc. has announced a series of ¼-in. tape drives for backup and archival storage of Winchester disks in small systems that operate on the same command set as ½-in. tape drives with no modifications to existing tape handlers.**

The DMT 730 series uses 8-track, ¼-in. tape cartridges and offers up to 48M bytes of storage and a mean time between failure of 10,000 hours. Data can be recorded using either serpentine or separate channel mode.

The DMT 730E model operates in a streaming mode at a data transfer rate of 86.7K bytes and tape speed of 90 in./sec. The DMT 730C operates in a start/stop mode at a data transfer rate of 28.9K bytes and tape speed of 30 in./sec. The units cost $1,400 to $1,500, depending upon options.

Anritsu America, 128 Bauer Drive, Oakland, N.J. 07436.

TERMINALS

■ **Ampex Corp. has announced terminals for corporate network and multiuser systems that emulate the Digital Equipment Corp. VT220 and VT100 terminals.**

The Ampex 220 is said to include an adjustable slope alphanumeric keyboard with key grouping and layout that emulates the DEC VT220. The user has a choice of data formats — either 24 lines by 80 col. or 24 lines by 132 col. The unit comes with a 14-in. nonglare screen. The Ampex 220 costs $749.

The company also released its Ampex 219 terminal that emulates the DEC VT100, VT102, VT131 and VT52 terminals and the Wyze Technology, Inc. WY-75 terminal. The terminal includes the four DEC general-purpose function keys. The unit has a 14-in. screen. The Ampex 219 costs $649.

Ampex, 401 Broadway, Redwood City, Calif. 94063.

SYSTEMS & PERIPHERALS

■ **Tektronix, Inc. has released a color version of its 1200 series logic analyzers.**

Based on the earlier 1240 model, the 1241 logic analyzer combines a proprietary liquid crystal color shutter with a 7-in. monochrome monitor. The 1241 features a vertical expansion mode that is said to double the height of timing diagram traces.

Three primary colors — yellow, green and red — make up the color display.

The 1241 costs from $8,600 to $21,000 for 9- to 72-channel systems.

Tektronix, P.O. Box 500, Beaverton, Ore. 97077.

■ **Digi-Tech Consultants has released its Satellite Terminal, said to allow up to five users to access a single-user Convergent Technologies, Inc. Ngen or Burroughs Corp. B25 workstation.**

The Satellite Terminal is said to allow the Ngen workstation, which is also sold as the NCR Corp. Worksaver and as Mohawk Data Sciences Corp.'s Hero workstation, to be used as a multiuser, multitasking computer.

It will reportedly enable users at remote sites to use a workstation via a modem. Features include a 14-in. green phosphor screen and full compatibility with most existing Ngen software. No changes will be needed to any user software, the vendor said.

The unit costs $1,750.

Digi-Tech Consultants, P.O. Box 12144, Dallas, Texas 75225.

PRINTERS/PLOTTERS

■ **Xerox Corp. has announced a daisywheel printer from its subsidiary, Diablo Systems, Inc., that is said to be connectable to most personal computers, word processors and workstations.**

The Xerox/Diablo Advantage D80 is said to produce letter-quality documents at speeds up to 80 char./sec. with noise measured as low as 58 dba. The unit features Diablo's all-purpose interface, which allows connection to RS-232, Centronics Data Computer Corp. or IEEE 488 interfaces.

Features include a semiautomatic paper feed, with an optional automatic dual-bin, cut-sheet paper feeder, an envelope feed and a bidirectional tractor for feeding forms and computer fanfold paper through the printer. The D80 uses Diablo's extended character set, which contains 200 char./print wheel. Multilingual print wheels are also available.

The unit costs $2,195. The bidirectional tractor costs $300, and the dual-bin, cut-sheet paper feeder costs $903 and will be available in the fourth quarter of 1985. The envelope feeder costs $300 and snaps onto the cut-sheet paper feeder.

Xerox, Xerox Sq. 006, Rochester, N.Y. 14644.

POWER SUPPLIES

■ **Solidstate Controls, Inc. has unwrapped a series of uninterruptible power supply (UPS) systems for minicomputer systems.**

The Powerbase 4000 series protects against blackouts, brownouts, sags, surges and frequency deviations. The UPS comes in four power-range sizes: 5, 10, 15 and 20 kVA with either single- or three-phase output for any real-time application.

Prices range from $5,000 to $30,000.

Solidstate Controls, P.O. Box 1216, Columbus, Ohio 43216.

■ **Power Systems & Controls, Inc. has unveiled its Monopowerpac power distribution and conditioning system for minis and mainframes.**

The Monopowerpac is said to protect against sags, surges, transients and brownouts. It uses a synchronous motor for continuous performance at -15% low voltage and -25% for up to one minute. The Monopowerpac is available in 30, 60 and 95 kVA ratings with I/O voltages of 208/208, 480/208 or 480/480.

Prices range from $30,000 to $35,000.

Power Systems & Controls, 3206 Lanvale Ave., Richmond, Va. 23230.

BOARD-LEVEL DEVICES

■ **Modular Computer Systems, Inc. has announced its Classic CT/15 single-board minicomputer that supports Modular Computer's MAX IV real-time operating system and virtual memory addressing capability.**

The CT/15 processor — a low-end addition to the company's Classic series — consists of a single-board CPU and contains either 512K bytes or 2M bytes of memory. An optional storage subsystem includes a 20M-byte Winchester-type formatted disk drive and a floppy disk drive for software loading. Standard Modular Computer peripherals and I/O subsystems are supported.

The 512K-byte version costs $11,500 without the storage subsystem, and $15,900 with the storage subsystem. The 2M-byte version costs $16,500 minus the storage option and $20,900 with the option.

Modular Computer Systems, P.O. Box 6099, 1650 W. McNab Road, Fort Lauderdale, Fla. 33310.

■ **National Instruments has released its general-purpose interface bus (Gpib) 410 interface card and software that is said to convert an IBM Personal Computer into an IEEE 488 bus analyzer.**

The product is said to be useful for Gpib troubleshooting and analysis applications, such as designing and debugging a network of test and measurement equipment controlled by a general-purpose computer.

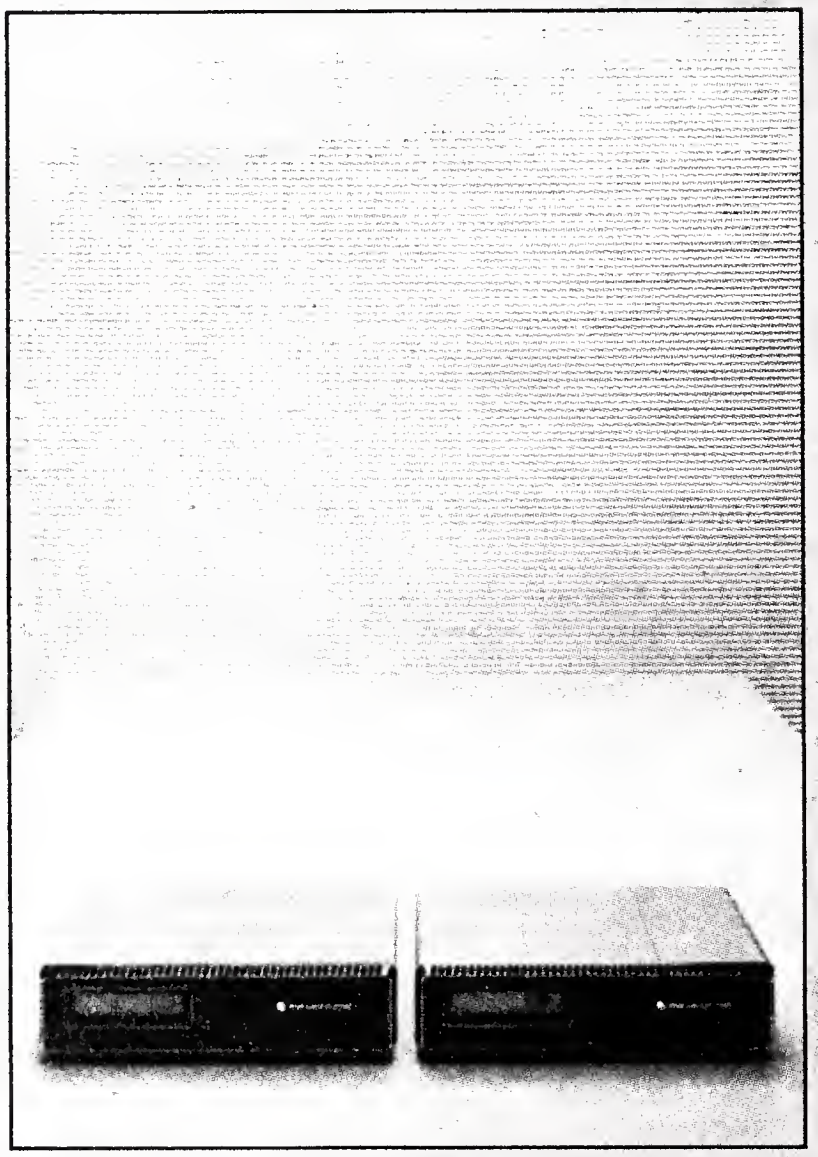
The unit costs $495 and will be available in mid-September 1985.

National Instruments, 12109 Technology Blvd., Austin, Texas 78727.

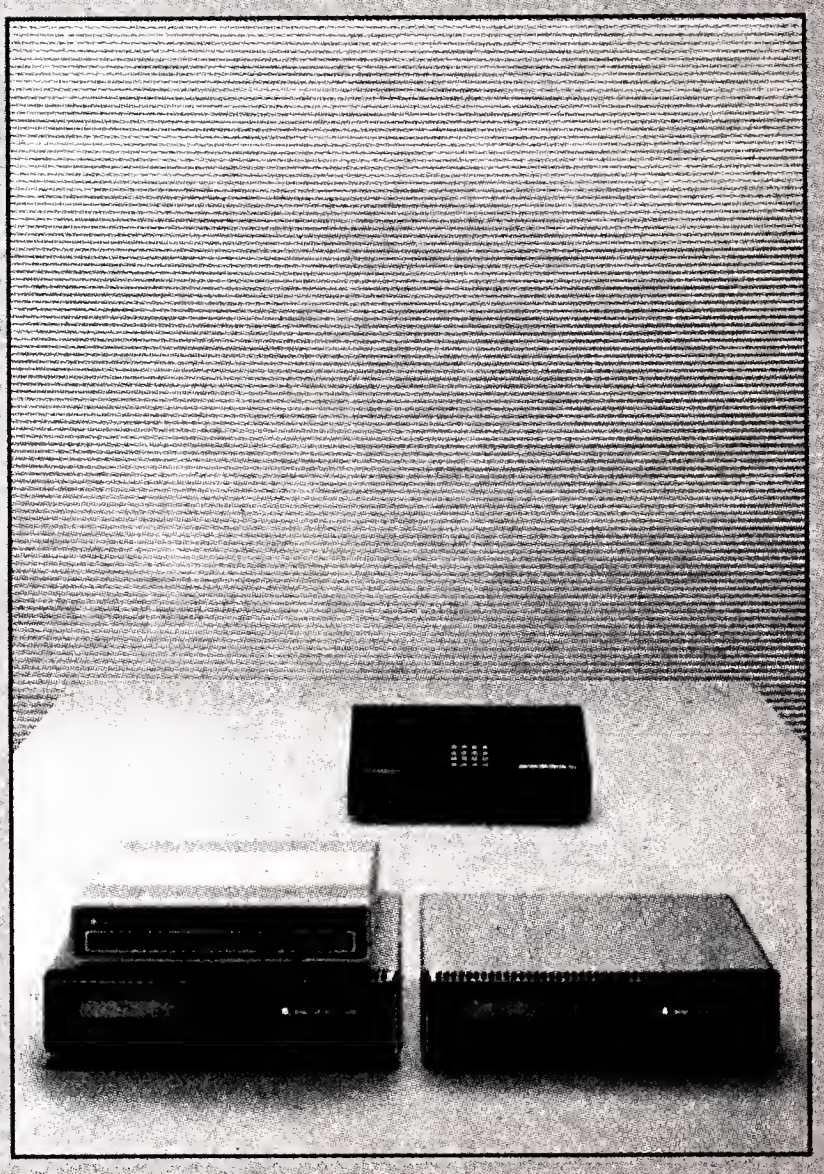
See **BOARDS** page 74

HOW TO KEEP YOUR NETWORK UP AND RUNNING.

THE DATAPHONE II SYSTEM. FROM AT&T.



The basics.



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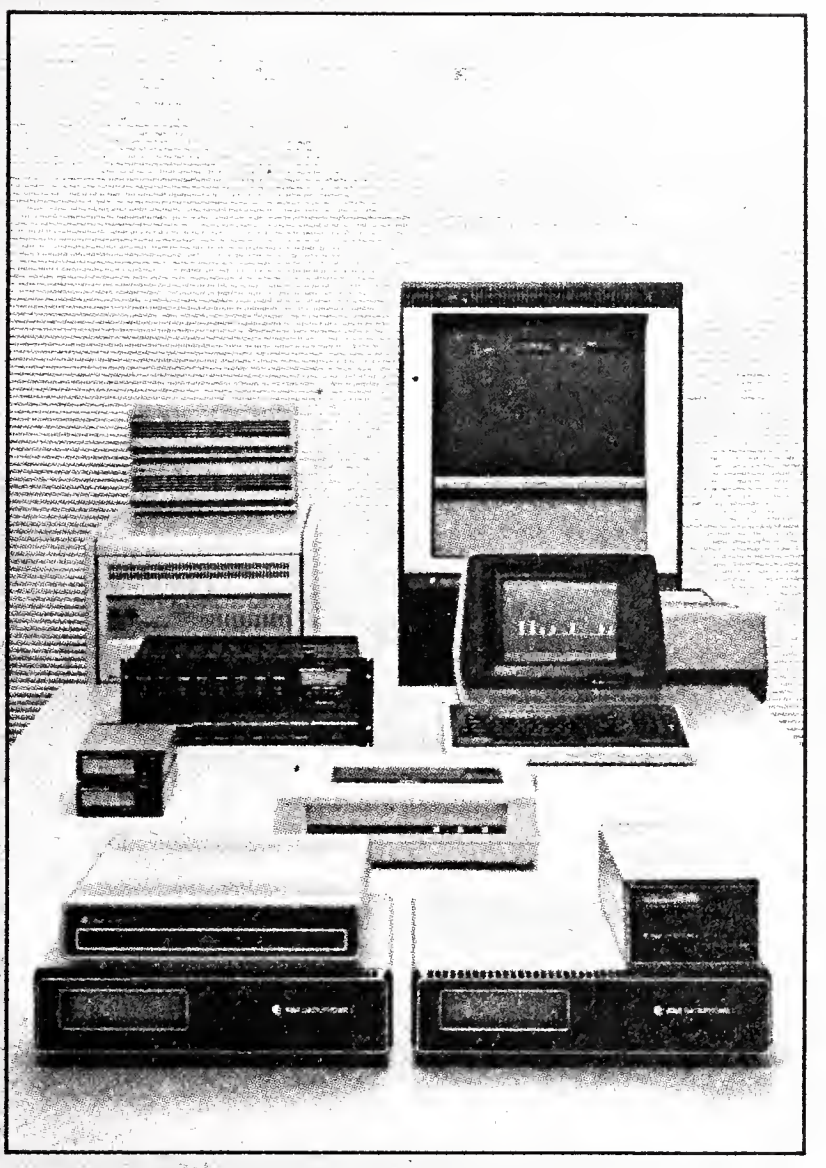

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SYSTEMS & PERIPHERALS

BOARDS from page 71

■ **Lexidata Corp. has announced Virtual Windows, an engineering workstation window management product supported by a board on the controller module of the company's LEX 90 graphics display processor. The product can be used with minicomputers from Digital Equipment Corp.; Data General Corp.; Honeywell, Inc.; Prime Computer, Inc.; Hewlett-Packard Co.; and others.**

Virtual Windows can display solid overlays and support color images in up to eight windows, a spokesman said. It does not require information stored on computer screen windows to be moved between display memory and the host CPU or disk memory.

Because the screen and bit map are separated, the need for a tightly coupled CPU and graphics display is said to be eliminated. Functions supported by Virtual Windows include split-window text scrolling, dynamic window size, dynamic priority setting, panning and scrolling of color graphics, solid overlays and double-buffering of bit map areas.

The product includes medium resolution of 640 by 512 pixels and high resolution of 1,280 by 1,024 pixels. Both configurations are based on the company's LEX 90/35 high-resolution graphics display system.

Virtual Windows as an option to the LEX 90 family costs $3,000. The price for Virtual Windows with the LEX 90/35 is approximately $17,000. The price for a high-resolution LEX 90/35 Virtual Windows system is approximately $23,000.

Lexidata, 755 Middlesex Tnpk., Billerica, Mass. 01865.

■ **Intel Corp. has announced a Multibus II development tool that is said to allow designers to use existing or proprietary Multibus I products in developing boards, systems and software based on the Multibus II bus architecture.**

The ISBC LNK/001 board serves as a translator between Multibus I- and Multibus II-based systems, allowing the Multibus II product being developed to gain access to the capabilities of Multibus I products as if they were resident in a Multibus II system. The board is a Multibus I form-factor board that resides in a Multibus I system and connects by ribbon cable to the Multibus II central services module.

The board costs $1,225.

Intel, Literature Department W242, 3065 Bowers Ave., Santa Clara, Calif. 95051.

■ **AST Research, Inc. has announced a hardware and software package that facilitates bidirectional file transfer between IBM Personal Computers and the IBM System/34, 36 and 38.**

The AST 5251-11 is a board with software that resides on the IBM Personal Computer and emulates the IBM 5251 Model 11 terminal. Included in the AST 5251-11 is VDI software, a virtual disk interface to IBM's File Support Utility that runs on System/34, 36 and 38 minis. The VDI software was developed by Tenman Systems, Inc.

The system costs $895.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

■ **Emulex Corp. has introduced its SC03/MS controller for Digital Equipment Corp.'s Microvax, MicroPDP or LSI-11 computers.**

The SC03/MS, which uses one quad slot in the computer's backplane, reportedly permits the use of drives of various capacities without the use of driver patches. It also incorporates a storage module drive interface, giving it the ability to handle large drives.

The SC03/MS reportedly transfers data at rates up to 1.8M byte/sec. and assumes such functions as error checking and correction, bad-block replacement, command prioritizing and seek optimization.

The SC03/MS is priced at $2,000.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

■ **Network Sciences Corp. (NSC) has released local-area network interface cards that allow IBM Personal Computers and compatibles and Digital Equipment Corp.'s Rainbow microcomputer to communicate with DEC minicomputers via a Corvus Systems, Inc. Omninet local-area network.**

NSC offers two types of DXZ cards: the DQZ for Qbus machines and the DUZ for Unibus machines. The DQZ emulates DEC's DZV11 multiplexer on a dual-size card, and the DUZ emulates three DEC DZ11 multiplexers on a single hex-size card. DXZ cards are said to remove the limitations of RS-232 connections while retaining compatibility with existing DEC software.

A complete DQZ kit is priced at $2,825, and the DUZ kit is priced at $6,400.

Network Sciences, 1857 Port Charles, Newport Beach, Calif. 92660.

WANG from page 67

piler and Wang's System Activity Monitor II make up the DP development packages.

Prices range from $115,000 to $145,000 for the VS 85 and from $137,000 to $167,000 for the VS 100 lines.

Wang's 7585VST system — the U.S. government-accredited Tempest version of the VS 85 — can now be upgraded from 4M to 8M bytes of main memory, and the number of workstations that can be added has been increased from 60 to 80.

The memory upgrade costs $44,000.

More information can be obtained from Wang, One Industrial Ave., Lowell, Mass. 01851.

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COMPUTER INDUSTRY

TRW enters bid for Datapoint spin-off

By Peter Bartolik
CW Staff

Just one month after its birth, the nation's youngest publicly traded third-party computer maintenance company last week became the subject of a takeover bid by the biggest nonaffiliated maintenance company.

Intelogic Trace, Inc., the San Antonio-based service spin-off of Datapoint Corp., became the target last Tuesday of a $177 million takeover bid by TRW, Inc., the $6 billion electronics and aerospace company that operates the largest computer maintenance organization not directly affiliated with a computer vendor. Intelogic Trace said it will consider the offer at its regularly scheduled Sept. 4 board of directors meeting.

Datapoint in early July spun off its service division into an independent company with shares owned by Datapoint shareholders. Under a proposal first announced in April, Intelogic Trace is negotiating to acquire the service division of Mohawk Data Sciences Corp. A spokesman for Intelogic told *Computerworld* that negotiations are continuing with Mohawk Data.

TRW, based in Cleveland, said its offer of $9.50 per share was contingent upon negotiation and execution of a definitive agreement, revisions to Intelogic Trace's service arrangements with Datapoint and TRW's satisfaction with the controversial Mohawk Data deal. Intelogic Trace's stock closed at $7.75 on the New York Stock Exchange the day prior to TRW's announcement.

The Mohawk Data transaction has been controversial due to Datapoint's stated intention to lend the troubled manufacturer $20 million upon acquisition of the service division. Both Mohawk Data and Datapoint were the targets last year of arbitrageur Asher B. Edelman, currently chairman of Datapoint and Intelogic Trace, who acquired large holdings in both companies with the intent of selling off various divisions of each. Some analysts have seen the Datapoint-Mohawk agreement as an attempt by Edelman to bail out Mohawk after failing in his initial liquidation strategy. A TRW spokesman said the company had become familiar with the Datapoint service operations during Edelman's earlier attempts to sell those operations.

One industry analyst said the Intelogic Trace acquisition is an indication of a growing trend toward consolidation among the leading third-party maintenance companies. According to John Erlandson, manager of the customer service

See **SERVICE** page 84

■ Three big U.S. companies recently doled out money for investments in companies involved in artificial intelligence and advanced software development/**80**

■ Paradyne became the latest company to take an unplanned vacation/**82**

■ A Control Data division announced it will begin providing third-party maintenance for IBM's System/34, 36 and 38 product lines/**84**

Start-up firms go overseas for capital backing

By Peter Bartolik
CW Staff

Reception of U.S. investors to initial public offerings by high-tech companies is lukewarm at best these days. This means that venture capitalists have to pour additional money into existing ventures to protect their investments, so resources are somewhat strained for start-ups. But some companies are avoiding the problem by finding new investors in other countries.

"What we are witnessing is the forming of an international [capital] market; there are opportunities in certain places at certain times," according to David Nosnick, partner and international financing specialist with the Boston office of Deloitte Haskins & Sells' High-Technology Industry Group.

In a recent interview, Nosnick said the Big Eight accounting firm's high-tech group is working with three U.S. companies that are prepared to float their initial public offerings on London's unlisted securities market. The group also is working with 10 others that hope to make that move. "There are at least 25 companies in the U.S. that are in different stages of going to the London market," he said.

David Elsbree, managing partner of the group, said that any disappearance of U.S. venture capital is a myth, but the inability to float initial public offerings at favorable rates is making new demands on the venture capital groups. Because the response of public investors is not favorable, the venture capitalists are required to participate with companies for a longer period and pump in additional rounds of financing to protect their initial investments.

The solution for start-ups is to link up in corporate partnering with larger companies, such as Eastman Kodak Co., that invest in start-ups. The alternative for start-ups and those seeking initial public offerings is to go international.

Nosnick said the London market is most receptive to U.S. companies, but opportunities are opening up in Amsterdam, Van-

See **CAPITAL** page 84

INDUSTRY INSIGHT
By Clinton Wilder
CW Staff Writer

And the crunch continues . . .

The battered computer industry is in for continued hard times well into 1986, according to William F. Zachmann, one of the few analysts who predicted the current slump at the beginning of this year.

The often iconoclastic Zachmann, vice-president of International Data Corp. in Framingham, Mass., said he believes that sluggishness in the overall U.S. economy will continue to affect computer purchases for the next several quarters. In a recent interview, he said that as corporate profits are squeezed and capital spending is trimmed, expensive computer acquisitions are, and will continue to be, harder for the MIS executive to justify.

"I think we are sliding into a recession, and I just don't see what is going to sustain high tech," the bow tie-clad Zachmann said. "Corporate profits are down, and the DP shops in those companies are trying to cut expenses.

See **ZACHMANN** page 83

Harvard expected to OK merger plan

LITTLETON, Mass. — Shareholders of Harvard Software, Inc. are expected to give final approval today to a plan to merge with Software Publishing Corp., maker of the PFS series of microcomputer software.

The acquisition will put an end to Harvard's operations here, which will be consolidated into Software Publishing's Mountain View, Calif., offices.

Eight of Harvard's 30 employees, all within its research and development and marketing and sales areas, were offered jobs at Software Publishing, according to Software Publishing President Fred Gibbons. Termination programs have been offered to the remaining 22 employees, he said.

Harvard Software President Richard Wolfson said he will work on a consulting basis with Software Publishing through the remainder of the year. Others at Harvard, including Shakeel Mozaffar, vice-president of marketing, would not comment on whether they were offered a position at Software Publishing.

The acquisition, announced in July, [CW July 8] is valued at approximately $4 million, Gibbons said. It is expected to give Software Publishing a presence in the corporate marketplace with Harvard's Project Manager software.

Software Publishing last year recorded a profit of $3.2 million on sales of $23 million. Harvard Software recorded net sales of $2.5 million for the six months ended June 30.

Judge sends NEC, Intel suit to trial

By Maura McEnaney
CW Staff

SAN JOSE, Calif. — The long-running battle between Intel Corp. and NEC Electronics, Inc. over alleged copyright infringement will go to trial in April 1986, a U.S. District Court judge has ruled.

Judge William A. Ingram recently denied Intel's request for a summary judgment on NEC's suit filed last December. The judge said the issue was too complex and should be determined through a complete trial. An April 28 court date was set.

The NEC suit, which represented the first shot fired in the copyright battle, attempted to thwart Intel's stated plans to sue NEC, a U.S. subsidiary of NEC Corp., over alleged copyright violations of its Intel 8086 and 8088 microprocessors. NEC argued that microcode — the set of instructions embedded on a microchip — can not be copyrighted.

In April 1984, NEC announced the V20 and V30 microprocessors, dubbed supersets or enhancements to the Intel chips, and Intel threatened legal action. Intel subsequently filed a counterclaim against NEC this past February, alleging copyright infringement.

NEC general counsel Robert Hinckley said the company was pleased with Ingram's decision to bring the case to trial. There are a number of issues that need further legal exploration, according to Hinckley. "We are confident that the NEC micro-

See **LAWSUIT** page 82

TI, Raytheon report ventures into AI

Two electronics giants, Texas Instruments, Inc. and Raytheon Co., recently announced ventures in the burgeoning artificial intelligence field.

Another leading manufacturing concern, Lockheed Corp., announced that it invested $10 million in Rational, the Mountain View, Calif.-based developer of the R1000 system that is designed to reduce the cost and time of developing large software systems written in the Ada language.

Dallas-based TI agreed to purchase a 10% equity interest in the Carnegie Group, Inc. of Pittsburgh, a privately held developer of AI software for manufacturing applications. Under terms of the agreement, Carnegie will receive cash and equipment credits for its stock and intends to use the credits to purchase TI hardware and software. Financial details were not released.

In addition, TI agreed to fund part of Carnegie's research and development for three years in exchange for technical training from Carnegie engineers and a license to distribute Carnegie technology and products internally.

Grant Dove, executive vice-president of TI, said the agreement would enhance the use of AI technology in TI's internal manufacturing operations as well as its position as a vendor of AI hardware and software products.

Raytheon announced a $4.5 million investment in Lisp Machines, Inc. of Cambridge, Mass., a developer of Lisp computers and associated software. The deal was the first struck by Raytheon Ventures, the new venture capital investment arm of the Lexington, Mass.-based defense electronics leader.

Raytheon Ventures President David A. Steadman said the company has no plans to acquire Lisp Machines.

Lockheed, the first beta test site of the R1000 hardware and software system, said its investment in Rational is "important to Lockheed's continued leadership in the aerospace industry."

Profit dip hits Cullinet

WESTWOOD, Mass. — Cullinet Software, Inc. last week reported that first-quarter profits dipped 23% from the year-earlier period as revenue increased by only 5%.

That news marked the first decline after 29 reporting periods of increasing profits. But it was not quite as severe as the 27% dip the company had projected earlier this month [CW, Aug. 12].

The company posted profits of $4.2 million, or 14 cents per share, compared with $5.5 million, or 18 cents per share, in the year-earlier period. Revenue was $42.3 million, up from $32.1 million.

Cullinet President and Chief Operating Officer Robert N. Goldman said in a statement announcing the results, "The earnings for this period represent a significant accomplishment in these economic times for our industry."

Altos earnings up 7% in '85

SAN JOSE, Calif. — Dampened by a fourth-quarter earnings drop of 39%, Altos Computer Systems, Inc.'s fiscal year ended June 29 showed only a 7% increase from fiscal 1984, the company announced recently.

Altos earned $2.24 million, or 15 cents per share, in the fourth quarter, compared with $3.71 million, or 24 cents per share, in the year-earlier quarter. Fourth-quarter revenue rose 2% to $33.7 million from $32.9 million a year ago.

Altos' profits for the fiscal year were $10.4 million, or 70 cents per share, compared with $9.75 million, or 65 cents per share, in fiscal 1984. Revenue rose 21%, from $102.7 million to $124.4 million.

Dave Jackson, Altos' president, chairman and chief executive officer, attributed the weak fourth quarter to the industrywide slowdown and Altos' shifted focus to its high-end, multiuser supermicros.

Sykes files for Chapter 11 aid

ROCHESTER, N.Y. — Sykes Datatronics, Inc., a vendor of telephone cost management systems and software here, recently filed for protection from its creditors under Chapter 11 of the Federal Bankruptcy Act.

Sykes filed the petition Aug. 15 after its two banks, Chase Lincoln First Bank and Chemical Bank, demanded payment of $7.5 million in loans, a spokeswoman said. In its most recent quarter ended May 31, Sykes posted a loss of $2.3 million on $2.7 million in revenue.

Sykes lost $14 million in the fiscal year ended Feb. 28, recording sales of $20.2 million during the year. Sykes employed about 270 people at the beginning of 1985.

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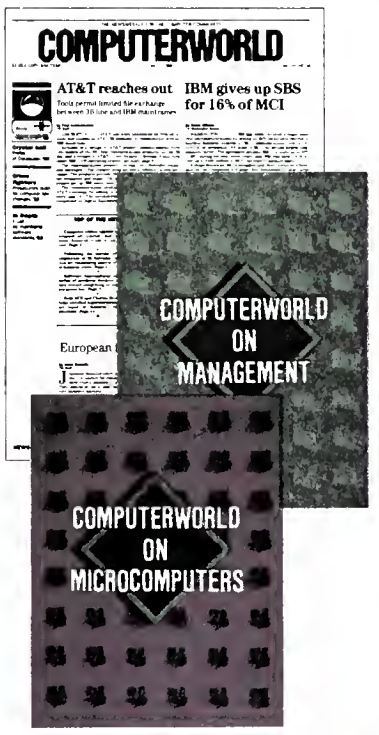

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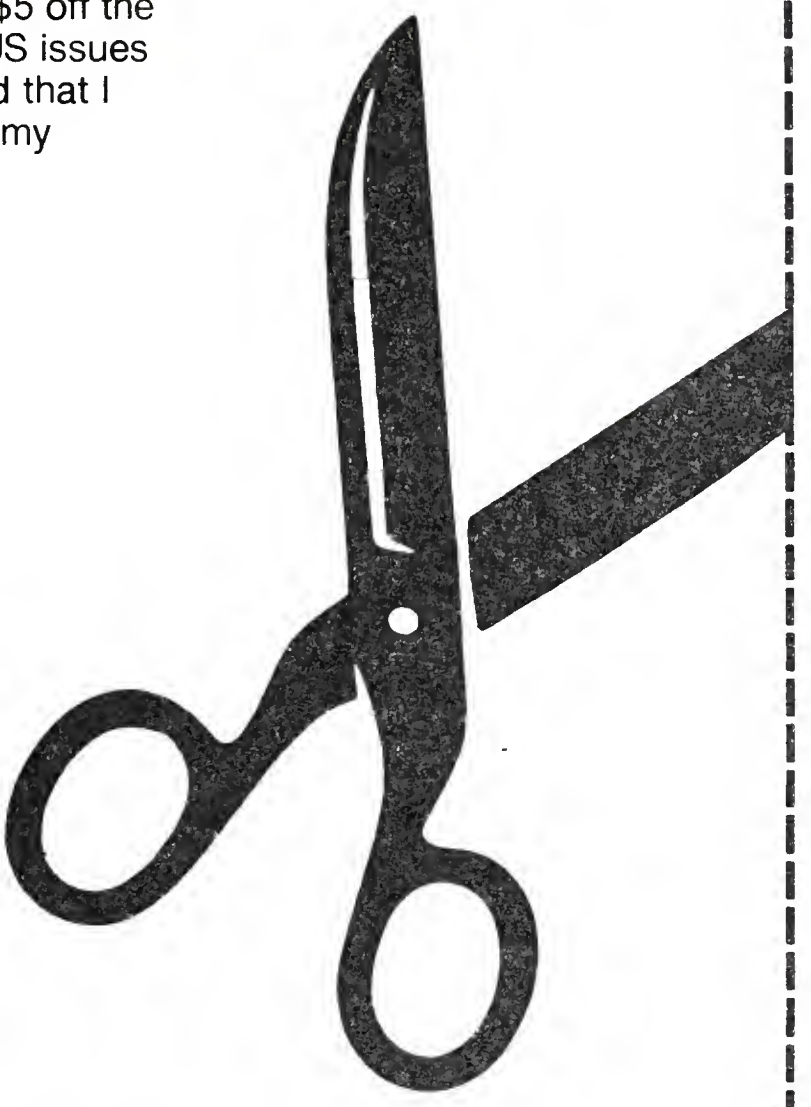

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Info line out

DENVER — McGraw-Hill, Inc. recently joined a corporate partnership to provide on-line data base information to home and office microcomputers through CATV systems.

The venture, called X-Press Information Services (XIS) and headquartered here, is also owned by Tele-Communications, Inc. and Telecrafter Corp. XIS will supplant Data Cable, the cable-to-computer news service launched by Tele-Communications and Telecrafter in 1984.

The partners said XIS will provide business, financial and economic information to subscribers.

A spokesman said XIS is scheduled to be available through 400 cable systems by the end of 1985.

Tandon, Teac announce out-of-court settlement

CHATSWORTH, Calif. — Tandon Corp. last week announced the out-of-court settlement of its lawsuit against Teac Corp., one of three Japanese companies orginally charged with infringing upon Tandon's patent for double-sided floppy disk drives.

Tandon had previously settled similar claims against Sony Corp. [CW, July 15].

Charges made by the American organization, based here, against Mitsubishi Electronics Corp. are still pending and being heard at an International Trade Commission (ITC) trial. The ITC trial began on Aug. 19.

Tandon to get royalties

Teac agreed that its 5¼-in. disk drives will be licensed under Tandon's patent, allowing Tandon to earn percentage royalties from the sale of the Teac drives.

In addition, Teac agreed to pay Tandon an undisclosed lump sum of money, which a Tandon spokesman called "a significant amount."

The settlement ends the actions filed by Tandon against Teac both before the ITC and in U.S. District Court in Los Angeles.

Paradyne plans leave

LARGO, Fla. — Paradyne Corp. recently announced that it will require an estimated 85% of its employees to take six unpaid vacation days during the balance of 1985.

The furlough will affect all of the data communications equipment vendor's approximately 3,300 employees except customer field service engineers and national technical support and service personnel.

George Pressly, Paradyne's senior vice-president of communications, said exempted employees will make a comparable contribution to furloughed employees but declined to elaborate.

The six furlough days include two this month, one each in September and October and two in December. Pressly said the days will generally be tacked on to holiday dates or weekends.

Paradyne laid off approximately 200 employees in June.

Delta Data posts first-quarter loss

TREVOSE, Pa. — Delta Data Systems Corp. recently reported a $1.99 million loss for the first quarter ended June 30 on a 39% decline in revenue.

The maker of terminals and turnkey systems for the legal and publishing markets lost 29 cents per share in the quarter. A year earlier, Delta earned $28,000, or 0 cents per share, including a one-time gain of $8,000. Sales dropped from $7.2 million in the year-earlier period to $4.4 million.

Delta President and Chairman Robert J. Smallacombe blamed most of the loss on a delay in placement of orders by a single large customer. He said the market for commercial data processing had softened considerably since the prior year.

The company will concentrate more of its marketing efforts in sales to government customers, which accounted for 69% of Delta's revenue in fiscal 1985, Smallacombe said.

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processor is an original design that was independently developed," Hinckley said.

When the Intel lawsuit comes to trial next April, NEC will argue against copyright protection for microcode.

Issue addressed last year

According to Hinckley, the U.S. Congress addressed the issue last year with the introduction of the Semiconductor Chip Protection Act.

The act protects chip designs but does not extend copyright protection to chips, Hinckley asserted.

Intel counsel expressed disappointment with the judge's ruling.

"Obviously we felt that [microcode] is copyrightable, but basically I can understand why [Ingram] wants the experts to testify," counsel said.

COMPUTER INDUSTRY

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Masscomp announced revenue for the fiscal year ended June 29 of $45.2 million, down from $21.9 million a year earlier. The company experienced an operating loss of $898,000, vs. a loss of $1.2 million last year.

■

QMS, Inc. achieved record third-quarter revenue of $11.6 million for the fiscal period ended June 28, compared with revenue of $8.3 million for the third period one year ago. Profits were $1.2 million, or 13 cents per share, compared with profits of $1.4 million, or 17 cents per share, for the similar period last year.

■

NBI, Inc. announced that revenue for the year increased 22% to $216.7 million from $177.1 million recorded last year. Profits were $13.2 million, or $1.41 per share, compared with $13.8 million, or $1.40 per share, for the prior year.

■

Hogan Systems, Inc. reported a net loss of $3 million, or 23 cents per share, compared with a net loss of $1.5 million, or 11 cents per share, in the prior year. Revenue was $4.1 million, compared with $6.7 million for the like period a year ago.

■

Intelligent Systems Corp. recorded revenue for its fiscal quarter ended June 30 of $28.4 million, compared with $30.2 million last year. Profits for the quarter were $837,000, or 8 cents per share, compared with $3.8 million, or 34 cents per share, in the prior year's quarter.

■

Miniscribe Corp. reported a net loss for the second quarter of $7.1 million, or 37 cents per share, compared with profits of $2.3 million, or 12 cents per share, for the corresponding period last year.

■

Modular Computer Systems, Inc. announced profits for the second quarter of $708,000, or 12 cents per share, compared with $1.3 million, or 24 cents per share, in the like period one year earlier. Revenue was $18.4 million, compared with $20.8 million in the second quarter of 1984.

■

Mentor Graphics Corp. reported second-quarter revenue of $33.5 million, compared with $18.5 million for the same period last year. Profits were $1.8 million, or 12 cents per share, compared with $1.4 million, or 10 cents per share, in the comparable period one year ago.

■

Wicat Systems, Inc. reported revenue for its first fiscal quarter ended June 30 of $9.6 million, up 48% over $6.5 million for the same period one year ago. Profits were $110,000, or one-half cent per share, compared with a loss of $1.8 million, or 9 cents per share, in the comparable quarter one year earlier.

■

Intergraph Corp. announced revenue for the second quarter of $130.6 million, compared with $98.8 million in the corresponding period last year. Profits were $16.8 million, or 31 cents per share, compared with $16.5

See **NICKELS** page 84

ZACHMANN from page 79

I don't see the purses opening anytime soon."

In addition to the macroeconomic picture, Zachmann said he sees a fundamental change in the nature of the computer market that bodes ill for many vendors — especially IBM. Zachmann said that price/performance ratios have become increasingly better as users move down the product line, with superminicomputers replacing mainframes and with multiuser micros, with their ability to run departmental applications, replacing minicomputers.

"Price/performance has historically been better on bigger systems but not anymore," he said. "There is no more expensive way to process data than a big IBM box running MVS. IBM is losing sales of its larger machines to 4381s and to [Digital Equipment Corp.] VAXs, which are in turn losing to cheaper, smaller minis. The idea that departments will outgrow their personal computers is a myth. Most of their applications don't even come close to using the capacity of an [IBM Personal Computer AT]."

Zachmann is particularly bearish on IBM's high end, feeling that the flow of dollars from the upcoming 3090 Model 200 will be considerably less than what Big Blue is counting on. "They have a very tough time ahead," he said. "The economy is mushy, and users have a big incentive not to buy more stuff, just when IBM needs strong volume sales of the 3090 to sustain its growth."

IBM's estimated 75% mainframe market share will change from an asset to an albatross, Zachmann said, as users increasingly concentrate their purchases in the more competitively priced mini market. "IBM can't have its quasi-monopoly prices in that area," he said. "I think IBM is vulnerable from below."

Zachmann predicted that the economy will not lift the computer industry out of its doldrums before the latter part of 1986. But he noted a few bright spots in his otherwise gloomy scenario — innovative niche companies whose technologies spell real solutions for users. In his view, the local-area networks of 3Com Corp., the network servers of Banyan Systems, Inc. and the fault-tolerant systems of Stratus Computer, Inc. are prime examples.

"Products that provide truly better price/performance or better functionality will sell well," he said.

SERVICE from page 79

program with the Mountain View, Calif.-based market research firm Input, Inc., leading companies in that industry segment are seeking acquisitions in order to meet their customers' requirements for improved service.

Third-party maintenance revenue

Input last year published a study indicating that revenue of third-party maintenance companies — not including vendor-owned organizations — was $1.14 billion in 1984 and will grow to $2.12 billion in 1988.

A study by Arthur Andersen & Co. published last year for the Association of Field Service Engineers predicted that the service industry — including both third-party and vendor-owned organizations — would generate revenue of $46 billion by 1990, more than double the revenue in 1984.

Analysts from Input and other firms have determined that lower prices are no longer the prime reason equipment users turn to third-party companies, according to Erlandson. "Users are becoming more demanding of a high level of service," Erlandson said.

Large third-party companies often provide better response time through regionalized operations and have highly trained field engineers, he said.

Datapoint, according to Erlandson, "has [had] an excellent service reputation in the past" and will provide TRW with a large installed base to service, a well-trained service force as well as a large base of revenue.

In 1984, according to Input estimates, TRW's Customer Services division was the country's largest third-party maintenance provider with estimated revenue of $198 million and a 17.4% market share; one industry source said the division generated revenue last year in excess of $150 million.

Datapoint officials earlier this year said Intelogic Trace, together with the Mohawk Data service organization, would represent the largest third-party organization with revenue amounting to more than $200 million.

Last year, Management Assistance, Inc. — another Edelman target organization that was successfully liquidated — sold its Sorbus Service division to Bell Atlantic Corp., an AT&T regional holding company, for $179 million.

CDC boosts maintenance

MINNEAPOLIS — Control Data Corp. last week announced it has expanded its third-party computer maintenance operations to include IBM System/34, 36 and 38 equipment.

The company said the service will include contract maintenance, installation and deinstallation and is available throughout the U.S. and in selected foreign countries. CDC's Engineering Services division will provide the service through its Comma organization.

The company said it will provide guaranteed two-hour response services and an 11-hour principal maintenance period.

The Engineering Services division now services IBM's Personal Computer, Series/1, 370, 3030 series and 4300 series equipment.

CAPITAL from page 79

couver, B.C., and other areas. The cost of making the offering in London is about 9% to 10% of the amount raised, compared with 15% in the U.S., Elsbree said.

According to Nosnick, the requirement to travel to London for annual meetings is a very attractive prospect for some entrepreneurs, but a more significant benefit is that they may also find international marketing opportunities simply by becoming "plugged into the network" abroad.

International investors at any particular time may have different concerns than U.S. investors, Nosnick said. Until Sinclair Research Ltd. and Acorn Computers Ltd. ran into difficulties in recent months, UK investors were still receptive to new hardware companies, he said. Similarly, the Amsterdam market is receptive to biotechnology firms, he added.

Elsbree said he doubted the U.S. would see another investor feeding frenzy like the one that occurred with the large number of IBM Personal Computer clone producers.

"I think the venture capitalists strayed from their own rules when they got into all these [Personal Computer] companies," he said, noting that a key rule to successful venture capitalism is to invest early and liquidate when the public market discovers the technology at issue.

NICKELS from page 83

million, or 32 cents per share, in the like quarter one year ago.

■

Sterling Software, Inc. said revenue for the third quarter totaled $6.8 million, compared with $4.6 million for the same period in 1984. Profits were $576,000, or 13 cents per share, compared with $335,000, or 8 cents per share, last year.

■

VM Software, Inc. reported an increase in second-quarter revenue to $4.2 million, compared with $2.7 million in the prior year's quarter. Profits were $590,543, or 16 cents per share, compared with $527,113, or 15 cents per share, last year.

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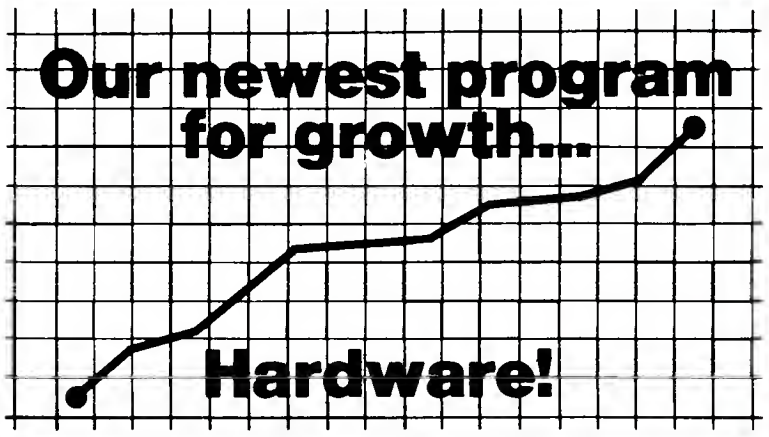

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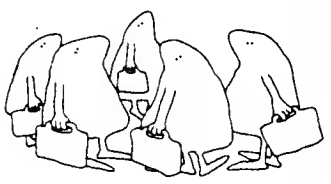

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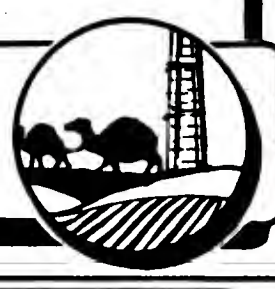

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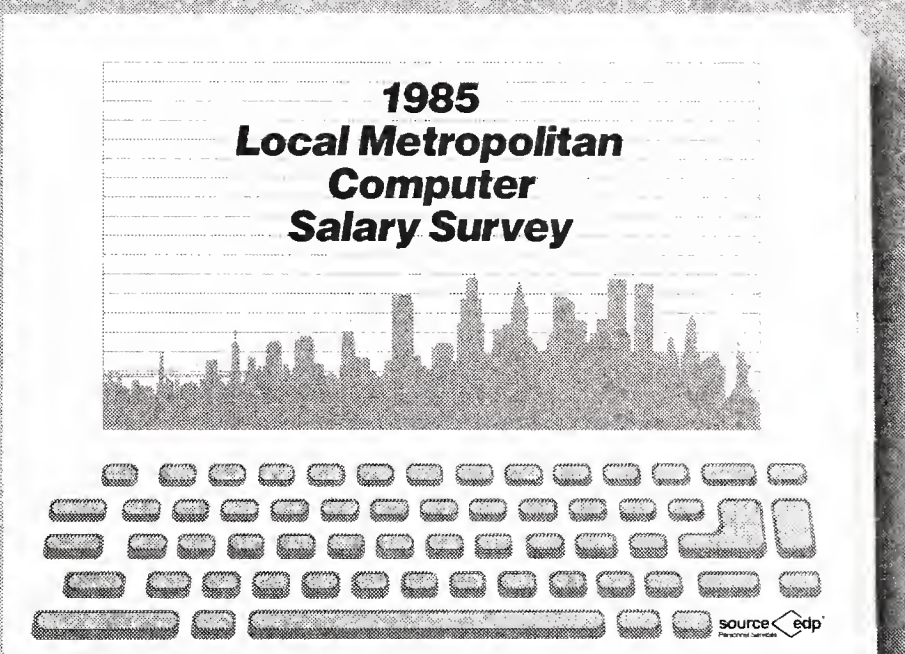
Simply call the Source Edp office nearest you, and we will mail a copy to you in complete confidence.



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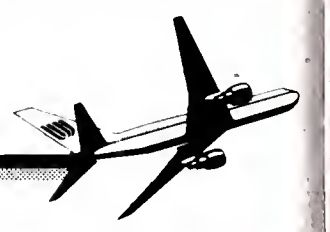

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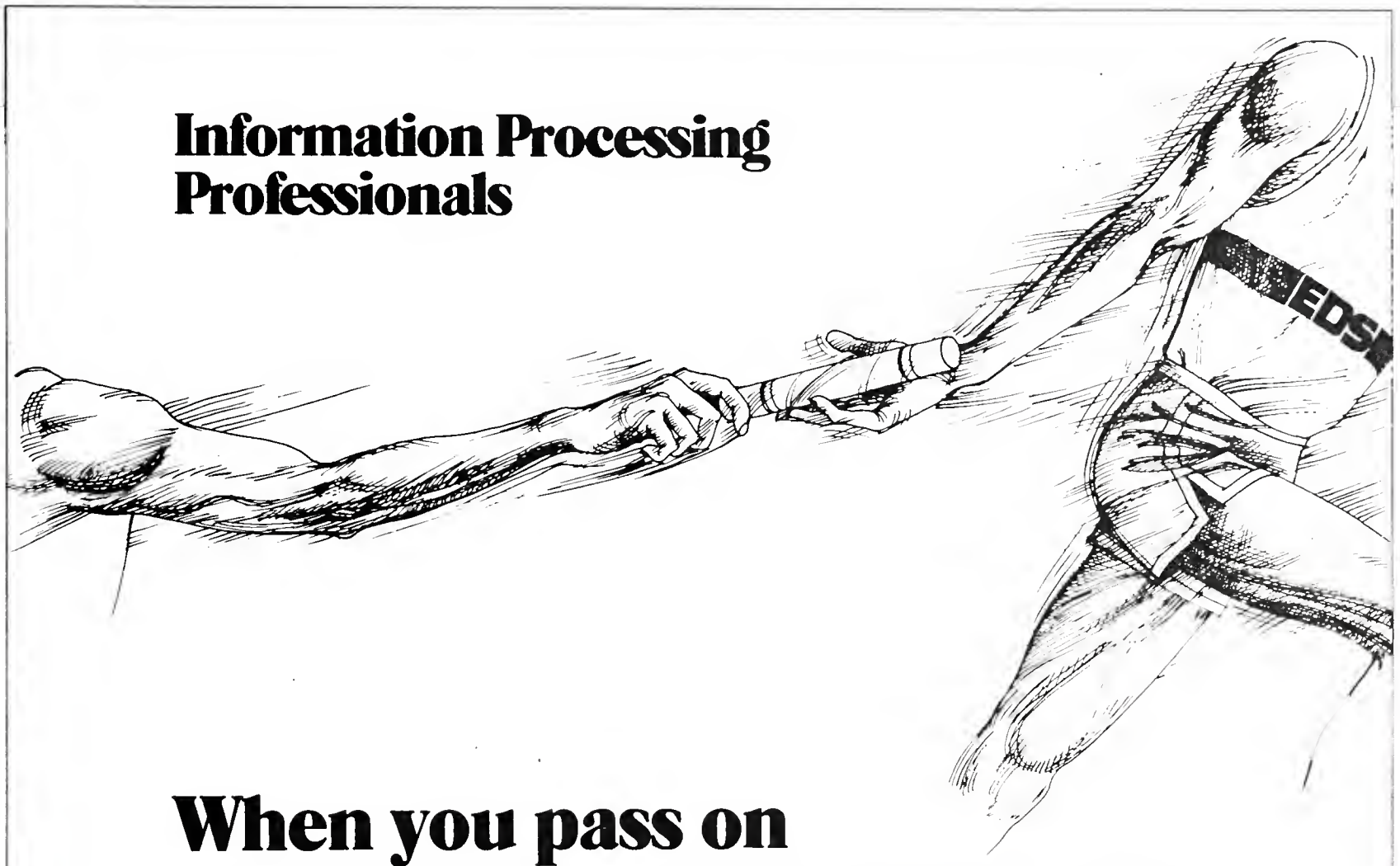
Information Processing Professionals



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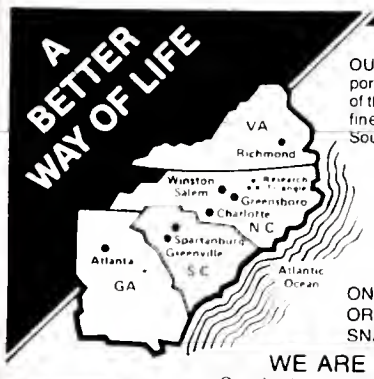

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County of FRESNO

DATA BASE ADMINISTRATOR

The County of Fresno in California is looking for an experienced Data Base Administrator to manage the data base, security and program library functions within the Computer Services Department. This is an excellent opportunity to manage the development of an organization responsible for data design, data dictionary, security administration and program change control/configuration management. Qualified applicants will have solid experience in at least two of these areas.

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In addition to an annual salary range of $38,714-$47,034, the County offers paid life insurance, paid medical/optical/dental insurance and a retirement plan. For more information about this opportunity and to obtain an application, contact

Lisa Patterson
Fresno County Personnel
2220 Tulare Street
3rd Floor, Golden State Plaza
Fresno, CA 93721
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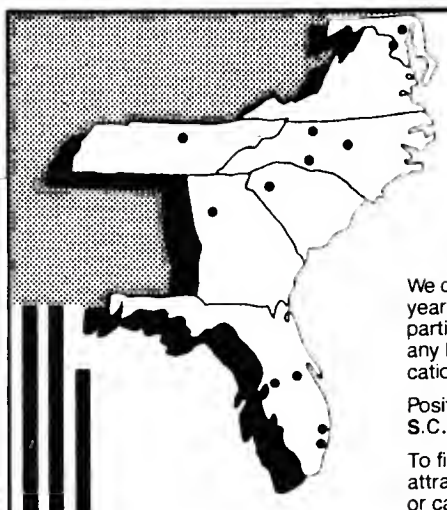

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CTG, is a twenty year old software consulting company with branch offices in 41 cities and annual revenues approaching $100 million.

The rapid expansion of our list of clients in the Southeast has created challenging assignments for software professionals with **IMS/DL-1.**

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Positions are available in: **Atlanta, Baltimore, Charlotte, Ft. Lauderdale, Greenville, S.C., Miami, Nashville, Orlando, Raleigh, Tampa, Washington, D.C., Winston-Salem.**

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- **PROJECT LEADER:** *4-6 years with some supervisory experience required. CICS and systems analysis experience a plus.*

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Salary $27,612.00/year. Applicants send this ad and your resume to: Job #5157, P.O. Box 9560, Sacramento, CA 95823-0560. No later than September 10, 1985.

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Apply knowledge of numerical method (finite element method) to develop and design 2-dimensional and 3-dimensional computer graphic systems for industrial and engineering application. Supervise a group of software engineers to develop and design computer graphic systems. Must have a Ph.D. degree in Computer Science or Engineering. Candidate's education must include at least 1 course in: Finite Element Method, Advanced Finite Element Method, Numerical Scientific Computation or Advanced Numerical Method, and Computer Graphics. In addition, candidates must have at least 1 publication involving finite element method. 40 hrs/wk, 8 am to 5 pm, $27,000 per yr. Send a resume and transcript of academic record to:
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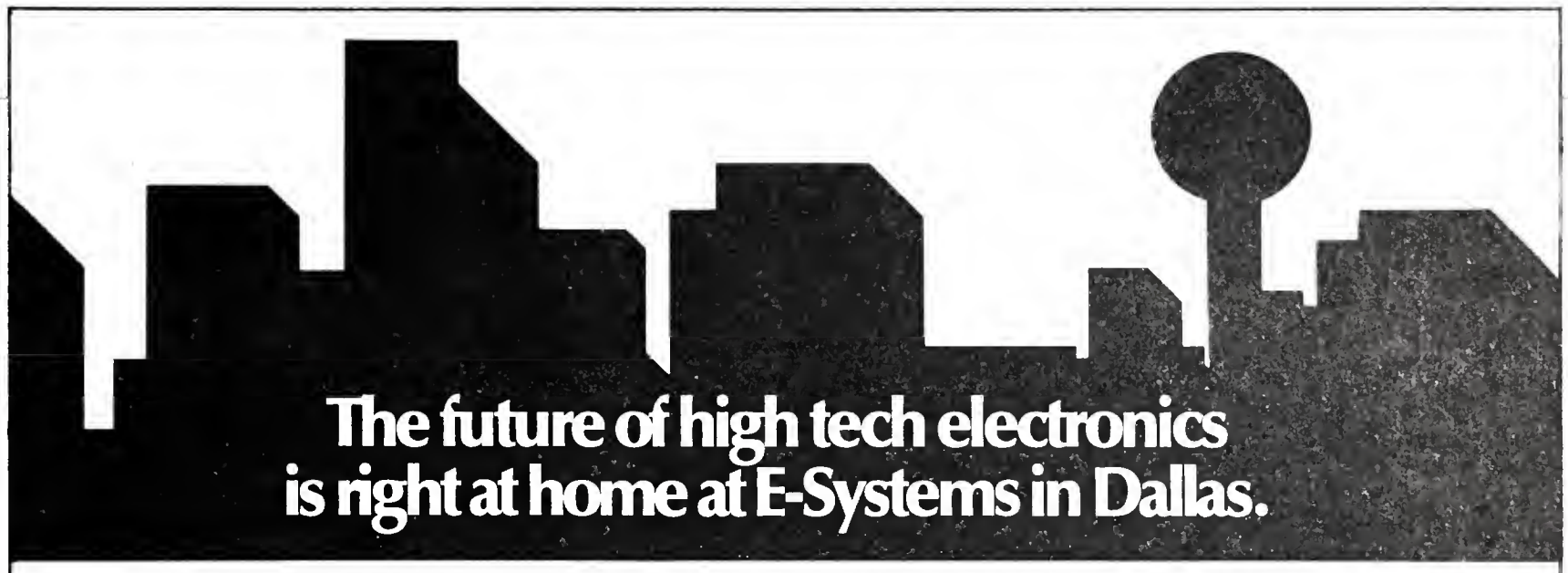

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Contact **Ann Olson** for specific information about these Senior positions:

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Reba McCarroll will give you more information regarding the following:

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Responsible for design, coding, and testing of systems level software. Position requires minimum of BSCS or BSEE degree with at least two or more years experience with the VAX 11/750 or 780 and VMS operating systems. Experience in one or more of the following areas is desirable: MIL-Standard documentation, UYK series computers and real time signal processing architecture.

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Responsible for the installation of IDMS in an IBM OS/MVS environment, for the design and maintenance of the data base and related data dictionary, and for the development and enforcement of standards and procedures for its usage. Requires a college degree and three to five years data base Design/Administration experience.

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Programmer Analyst

We're EG&G Florida, the Base Operations Contractor for the Kennedy Space Center. Our diversified scope of activities keeps us involved in all phases of the space program from maintenance, security, fire protection and environmental health to technical, administrative and computer support. Our employees and subcontractors number over 2000, and right now we're looking for a Programmer Analyst to become a member of our EG&G team.

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EOE M/F/H

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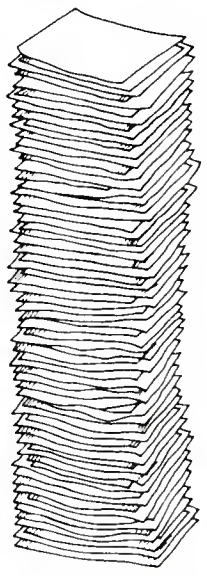

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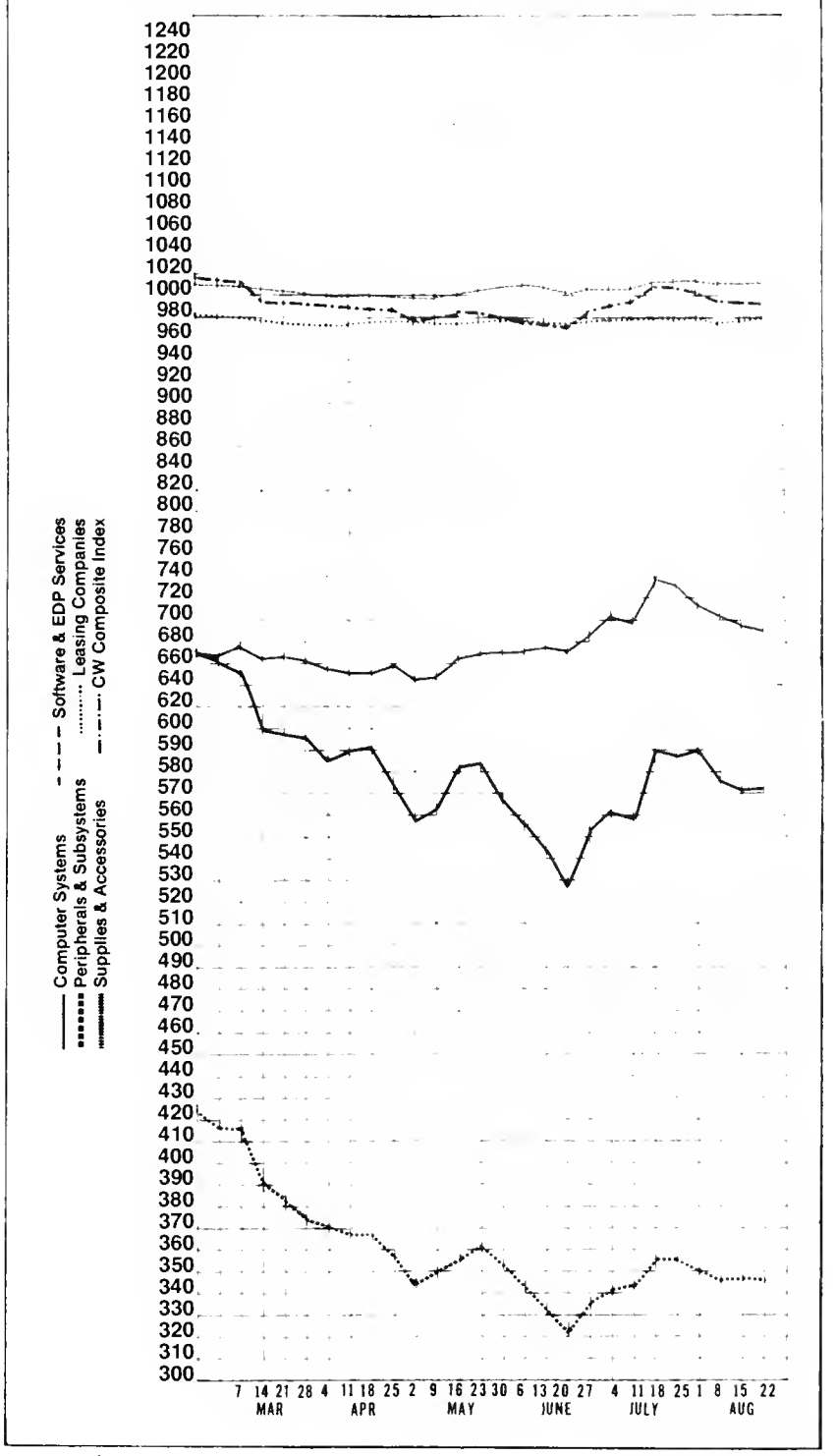

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CLOSING PRICES WEDNESDAY, AUGUST 14, 1985

All statistics compiled computed and formatted by TRADE QUOTES INC Cambridge Mass 02139

		1985 RANGE (1)	CLOSE AUG 21	NET WEEK CHNGE	PCT WEEK CHNGE
	COMPUTER SYSTEMS				
O	ALPHA MICROSYSTEMS	5- 12	5 3/4	- 1/8	-2.1
O	ALTOS COMPUTER SYST	7- 14	10 1/2	- 1/4	-2.3
A	AMDAHL CORP	10- 19	14	+ 1/4	+1.8
O	APPLE COMPUTER INC	14- 31	15 1/4	+ 5/8	+4.2
N	AT&T	18- 25	21 7/8	+1 1/4	+6.0
N	BURROUGHS CORP	51- 66	64 5/8	+2 1/8	+3.3
O	COMPAD COMPUTER CP	4- 12	11 1/2	+1	+9.5
O	COMPUTER AUTOMATION	3- 9	7 1/8	+ 3/8	+5.5
A	COMPUTER CONSOLES	5- 20	6 3/4	-1 3/8	-16.9
N	CONTROL DATA CORP	23- 39	22 7/8	- 1/2	-2.1
O	CONVERGENT TECHNOL	5- 17	9	- 1/8	-1.3
O	CPT CORP	5- 12	6 1/8	+ 1/8	+2.0
N	CRAY RESEARCH INC	23- 50	48 3/4	+3	+6.5
O	DAISY SYSTEMS CORP	21- 38	24 3/4	- 1/4	-1.0
N	DATA GENERAL CORP	31- 76	38 1/8	+1 1/2	+4.0
N	DATAPOINT CORP	5- 23	4 7/8	- 1/8	-2.5
N	DIGITAL EQUIPMENT	85-126	102 3/4	+1 1/8	+1.1
A	EECO INC	12- 16	14 7/8	0	0.0
N	ELECTRONIC ASSOC.	3- 6	4 7/8	0	0.0
N	FLOATING POINT SYST	15- 35	32 1/4	+ 3/4	+2.3
N	FOXBORO	24- 34	26	- 1/4	-0.9
N	GOULD INC	20- 32	25	-1 1/4	-4.7
N	HARRIS CORP	25- 35	26 1/8	- 1/2	-1.8
N	HEWLETT-PACKARD CO	31- 44	36	- 5/8	-1.7
N	HONEYWELL INC	53- 67	64 1/2	+ 3/4	+1.1
N	IBM	116-138	128 3/8	+1 5/8	+1.2
O	IPL SYSTEMS INC	1- 4	2	+ 1/8	+6.6
N	ITT CORP	24- 37	32 1/2	- 1/4	-0.7
N	M/A-COM INC	16- 24	20	0	0.0
N	MANAGEMENT ASSIST	2- 29	2 1/2	+ 1/8	+5.2
N	MATSUSHITA ELEC(ADR)	52- 66	55 1/8	- 1/8	-0.2
N	MODULAR COMPUTER SYS	6- 10	6 7/8	- 1/8	-1.7
N	MOHAWK DATA(CI	2- 15	1 7/8	- 1/8	-6.2
N	MOTOROLA INC	28- 44	36 3/8	+1	+2.8
N	NAT'L SEMICONDUCTOR	10- 17	13 5/8	+ 1/8	+0.9
N	NBI INC	13- 21	16	+ 1/2	+3.2
N	NCR	23- 36	34 1/4	+1 3/4	+5.3
N	PERKIN-ELMER	22- 30	26 1/4	- 3/8	-1.4
N	PRIME COMPUTAR INC	15- 20	18	- 7/8	-4.6
N	SPERRY CORP	35- 59	49 5/8	+ 3/4	+1.5
O	STRATUS COMPUTER INC	8- 19	16 1/2	-1	-5.7
O	TANDEM COMPUTERS INC	14- 29	15 1/4	- 1/8	-0.8
N	TANDY CORP	24- 37	34 5/8	+ 3/4	+2.2
O	TELEVIDEO SYSTEMS	2- 7	2 3/8	0	0.0
O	TELXON CORP	7- 18	17	+ 1/2	+3.0
N	TEXAS INSTRUMENTS	86-148	96 3/4	-1 7/8	-1.9
A	ULTIMATE CORP	8- 24	13 1/2	+ 1/8	+0.9
O	VECTOR GRAPHICS INC	0- 1	1/4	0	0.0
A	WANG LABS "B"	15- 32	16 5/8	-1	-5.6
A	WANG LABS "C"	15- 32	16 7/8	- 3/8	-2.1
N	XEROX CORP	47- 56	52 1/2	0	0.0
	LEASING COMPANIES				
N	COMDISCO INC	8- 20	19 5/8	+1 7/8	+10.5
O	CONTINENTAL INFO SYS	5- 12	11 1/8	- 1/8	-1.1
O	FINALCO GROUP INC	3- 7	5 1/8	0	0.0
O	PHOENIX AMERICAN INC	2- 8	2 1/4	0	0.0
O	SELECTERM INC	8- 14	7 7/8	- 1/4	-3.0
N	U.S. LEASING	33- 43	34 7/8	+ 1/8	+0.3
	COMPONENTS				
N	ADVANCED MICRO DEV	23- 41	28 7/8	+ 1/8	+0.4
O	ADV'D SEMICONDUCTOR	9- 25	9	-1 1/2	-14.2
N	ANALOG DEVICES INC	16- 25	21	-1 1/8	-5.0
O	ANALOGIC CORP	9- 16	14 1/2	- 1/8	-0.8
N	APPLIED MAGNETICS CP	8- 16	14 1/8	- 3/8	-2.5
O	HADCO CORP	3- 10	4	- 1/8	-3.0
O	MICRO MASK INC	6- 14	7 7/8	- 1/8	-1.5
N	TERADYNE	20- 35	23 5/8	+1 3/8	+6.1

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		1985 RANGE (1)	CLOSE AUG 21	NET WEEK CHNGE	PCT WEEK CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	2- 4	3	0	0.0
N	ADVANCED SYSTEMS INC	9- 20	12	- 1/4	-2.0
N	AGS COMPUTERS INC	10- 17	16 1/4	+ 1/4	+1.5
O	AMERICAN SOFTWARE	7- 15	13 1/4	- 1/2	-3.6
N	ANACOMP INC	1- 4	3	+ 1/8	+4.3
O	ANALYSTS INTL CORP	5- 11	9 1/4	- 1/4	-2.6
N	APPLIED DATA RES	22- 40	23 1/2	- 5/8	-2.5
O	ASHTON TATE	6- 13	12 1/8	- 3/8	-3.0
O	ASK COMPUTER SYSTEMS	11- 24	13 1/2	- 1/8	-0.9
B	ASTRADYNE COMP IND	1- 7	2 3/4	0	0.0
N	AUTOMATIC DATA PROC	35- 55	50 3/4	+2	+4.1
O	COMPUTER ASSOC INT'L	16- 30	25 1/4	+2	+8.6
O	COMPUTER HORIZONS	5- 11	11 1/4	+ 1/4	+2.2
O	COMPUTER NETWORK	5- 10	7 1/8	- 1/8	-1.7
N	COMPUTER SCIENCES	12- 24	23 1/2	+3 1/8	+15.3
O	COMPUTER TASK GROUP	10- 20	18 1/2	+ 1/4	+1.3
O	COMPUTER USAGE	1- 3	2 3/4	+ 1/4	+10.0
O	COMPUTONE SYSTEMS	4- 11	5 7/8	+ 3/8	+6.8
D	COMSERV CORP	1- 6	2 7/8	- 1/8	-4.1
O	COMSHARE	6- 10	9 5/8	+1	+11.5
N	CULLINET SOFTWARE	18- 33	17 1/2	-1	-5.4
O	CYCARE SYSTEMS INC	18- 27	19 1/2	- 1/2	-2.5
O	HOGAN SYSTEM INC	4- 15	4 5/8	+ 1/4	+5.7
N	GENERAL ELECTRIC CO	53- 65	61 5/8	+1	+1.6
N	GENL MOTORS E (EDS)	17- 47	42 1/4	+2 7/8	+7.3
N	GTE CORP	38- 45	39 3/4	- 1/8	-0.3
N	INFORMATICS GENERAL	13- 27	26 7/8	0	0.0
O	INFORMATION SCIENCE	1- 6	1 3/4	- 1/4	-12.5
O	INFOTRON SYSTEMS CP	15- 35	22 1/2	+ 3/4	+3.4
O	KEANE ASSOCIATES	9- 19	17	0	0.0
N	LOGICON	24- 38	34 5/8	- 3/8	-1.0
O	LOTUS DEVELOPMENT CP	17- 34	25 3/4	- 1/4	-0.9
O	MCI COMMUNICATIONS	7- 11	8 7/8	- 1/4	-2.7
O	MNGT SCI AMER INC	9- 16	14 1/2	+ 1/4	+1.7
O	MATHEMATICAL AP GRP	3- 9	3 3/8	- 1/4	-6.8
O	MICOM SYSTEMS INC	14- 42	19 1/2	- 1/2	-2.5
O	MICROPRO INT'L CP	2- 4	2 3/8	- 1/8	-5.0
O	NATIONAL DATA CORP	7- 16	13	- 3/8	-2.8
O	ON-LINE SOFTWAE INT	4- 10	8 1/4	+ 1/2	+6.4
O	PANSOPHIC SYSTEMS	11- 25	23 1/4	0	0.0
N	PLANNING RESEARCH	9- 17	15 3/4	0	0.0
O	POLICY MGMT SYSTS CP	18- 35	30	+2 3/8	+13.4
O	PROGRAMMING & SYS	4- 6	5 5/8	0	0.0
O	REYNOLDS & REYNOLD	29- 44	40 1/2	0	0.0
O	SEI CORP	11- 19	17 3/4	0	0.0
O	SHARED MEDICAL SYST	24- 34	32 1/2	+1 3/8	+4.4
O	SCIENTIFIC COMPUTERS	5- 12	6 1/8	+ 1/8	+2.0
O	SOFTWARE AG	11- 22	15	0	0.0
N	URS CORP	10- 14	12 1/8	+ 1/8	+1.0
N	UCCEL	9- 17	15 1/2	+ 1/2	+3.3
	PERIPHERALS & SUBSYSTEMS				
P	AM INTERNATIONAL	3- 9	3 3/4	+ 1/8	+3.4
A	ANDERSON BACOBSON	3- 11	2 3/4	- 1/8	-4.3
O	AST RESEARCH INC	7- 23	16 1/2	+ 5/8	+3.9
O	AUTO-TROL TECHNOLOGY	6- 15	6	0	0.0
O	AVANT GARDE COMPUTNG	6- 26	8	+ 1/2	+6.6
O	BANCTEC INC	5- 12	9 3/4	+ 1/8	+1.2
O	BEEHIVE INT'L	1- 2	1/8	0	0.0
N	BOLT,BERANEK & EW	19- 30	28 1/2	+ 1/8	+0.4
O	CAMBEX CORP	1- 3	1	- 1/8	-11.1
N	CENTRONICS DATA COMP	3- 12	4 1/8	- 1/4	-5.7
A	CETEC CORP	6- 10	7 1/8	0	0.0
A	COGNITRONICS	4- 7	5 1/4	- 1/4	-4.5

		1985 RANGE (1)	CLOSE AUG 21	NET WEEK CHNGE	PCT WEEK CHNGE
N	COMPUGRAPHIC CORP	26- 37	26 1/2	- 5/8	-2.3
O	COMPUTER TRANSCEIVER	1- 4	5/8	0	0.0
N	COMPUTERVISION CORP	12- 46	14 1/2	- 3/8	-2.5
N	CONRAC CORP	13- 16	13 5/8	+ 1/8	+0.9
A	DATAPRODUCTS CORP	11- 24	12 5/8	- 1/4	-1.9
A	DATARAM CORP	3- 7	5 5/8	- 3/8	-6.2
O	DATA SWITCH CORP	4- 9	5 1/4	+ 5/8	+13.5
O	DATUM INC	5- 9	5 5/8	+ 1/8	+2.2
O	DECISION DATA COMPUT	9- 19	10 1/2	-2	-16.0
O	DOCUTEL-OLIVETTI	3- 8	5 3/8	0	0.0
O	ENDATA, INC	3- 9	7 1/8	- 3/8	-5.0
O	EVANS & SUTHERLAND	4- 25	3 7/8	+ 1/8	+3.3
O	GANDALF TECHNOLOGIES	6- 16	12 7/8	+ 5/8	+3.6
N	GEN'L DATA COMM IND	6- 20	6 1/8	- 1/8	-2.0
N	HAZELTINE CORP	13- 35	13	+ 3/8	+2.9
O	ICOT CORP	3- 28	28 1/8	- 1/8	-0.4
O	INFORMATION INTL INC	7- 17	6 5/8	+ 1/8	+1.9
O	INTECOM INC	4- 15	14 1/2	-1 1/2	-9.3
O	INTEL CORP	6- 38	5 7/8	- 1/2	-7.8
A	LUNDY ELECTRONICS	7- 26	26 1/4	-1 1 4	-4.5
O	MEGADATA COUP	4- 14	13 3/4	0	0.0
A	MSI DATA CORP	5- 13	4 5/8	+ 1/4	+5.7
N	NASHUA CORP	8- 30	8	+ 1/4	+3.2
O	NETWORK SYSTEMS CORP	15- 27	26 1/4	0	0.0
N	NO AMERICAN PHILIPS	24- 45	24 3/8	+ 3/4	+3.1
N	NORTHERN TELECOM LTD	30- 42	35 1/8	+ 3/8	+1.0
O	OMEX	1- 38	37 5/8	+ 3/8	+1.0
N	PARADYNE CORP	1- 3	3/8	0	0.0
A	PENRIL CORP	8- 14	10 1/8	- 1/4	-2.4
N	PLESSEY CO (ADR)	9- 29	9	0	0.0
O	PRINTRONIX INC	9- 23	22 1/4	+1 3/4	+8.5
O	QMS INC	8- 17	12 3/8	+ 3/8	+3.1
O	RAMTEK CORP	3- 11	10 3 4	0	0.0
N	RECOGNITION EQUIP	4- 17	4	+ 3/8	+10.3
N	SANDERS ASSOCIATES	10- 51	9 3/4	- 5/8	-6.0
O	SCAN-TRON CORP	11- 36	36 3/8	+ 7/8	+2.4
N	SCIENTIFIC ATLANTA	8- 16	15 3/4	+ 3/4	+5.0
O	SEAGATE TECHNOLOGY	4- 14	14 3/8	+1 1/2	+11.6
N	STORAGE TECHNOLOGY	2- 12	7 1/4	0	0.0
O	SYKES DATATRONICS	1- 3	2 1/4	- 1/8	-5.2
A	T BAR INC	0- 11	3/8	- 1/8	-25.0
A	TAB PRODUCTS CO	5-020	5	- 1/8	-2.4
O	TANDON CORP	4- 19	18 7/8	- 5/8	-3.2
A	TEC INC	5- 13	4 5/8	+ 1/4	+5.7
N	TEKTRONIX INC	8- 68	8 3/8	- 7/8	-9.4
N	TELE-	30- 63	63	+ 1/8	+0.1
O	TESDATA SYSTEMS CP	1- 42	41 1/2	+1 1/8	+2.7
N	TIMEPLEX INC	1- 23	1 1/4	- 1/4	-16.6
N	TITAN CORP	5- 20	20	+ 7/8	+4.5
O	VISUAL TECHNOLOGY	1- 10	1 1/2	+ 1/8	+14.2
	SUPPLIES & ACCESSORIES				
N	AMERICAN PUB PRODS	21- 29	26 3 8	+ 3/4	+2.8
N	BARRY WRIGHT	18- 33	21 1 4	-1 1/2	-6.5
A	DUPLEX PRODUCTS INC	12- 19	19	+ 1/4	+1.3
N	ENNIS BUS. FORMS	14- 20	18 1/2	+ 1/8	+0.6
N	3M COMPANY	74- 88	77	-1 1/4	-1.5
N	MOORE CORP LTD	13- 22	18 5 8	- 3/8	-1.9
O	STANDARD REGISTER	18- 39	36 1/2	- 3/4	-1.3
N	WALLACE COMP SERVICE	28- 49	35 1/4	- 1/8	-0.3

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Lattice C Compilers for Your IBM Mainframe

Two years ago...
SAS Institute launched an effort to develop a subset of the SAS® Software System for the IBM Personal Computer. After careful study, we agreed that C was the programming language of choice. And that the Lattice® C compiler offered the quality, speed, and efficiency we needed.

One year ago...
Development had progressed so well that we expanded our efforts to include the entire SAS System on a PC, written in C. And to insure that the language, syntax, and commands would be identical across all operating systems, we decided that all future versions of the SAS System—regardless of hardware—would be derived from the same source code written in C. That meant that we needed a C compiler for IBM 370 mainframes. And it had to be good, since all our software products would depend on it.

So we approached Lattice, Inc. and asked if we could implement a version of the Lattice C compiler for IBM mainframes. With Lattice, Inc.'s agreement, development began and progressed rapidly.

Today...
Our efforts are complete—we have a first-rate IBM 370 C compiler. And we are pleased to offer this development tool to you. Now you can write in a single language that is source code compatible with your IBM mainframe and your IBM PC. We have faithfully implemented not only the language, but also the supporting library and environment.

Features of the Lattice C compiler for the 370 include:

- **Generation of reentrant object code.** Reentrancy allows many users to share the same code. Reentrancy is not an easy feature to achieve on the 370, especially if you use non-constant external variables, but we did it.
- **Optimization of the generated code.** We know the 370 instruction set and the various 370 operating environments. We have over 100 staff years of assembler language systems experience on our development team.
- **Generated code executable in both 24-bit and 31-bit addressing modes.** You can run compiled programs above the 16 megabyte line in MVS/XA.
- **Generated code identical for OS and CMS operating systems.** You can move modules between MVS and CMS without even recompiling.
- **Complete libraries.** We have implemented all the library routines described by Kernighan and Ritchie (the informal C standard), and all the library routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly. Especially significant is our byte-addressable Unix®-style I/O access method.
- **Built-in functions.** Many of the traditional string handling functions are available as built-in functions, generating in-line machine code rather than function calls. Your call to move a string can result in just one MVC instruction rather than a function call and a loop.

In addition to mainframe software development, you can also use our new cross-compiler to develop PC software on your IBM mainframe. With our cross-compiler, you can compile Lattice C programs on your mainframe and generate object code ready to download to your PC.

With the cross-compiler, we also offer PLINK86™ and PLIB86™ by Phoenix Software Associates Ltd. The Phoenix link-editor and library management facility can bind several compiled programs on the mainframe and download immediately executable modules to your PC.

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We believe that the C language offers the SAS System the path to true portability and maintainability. And we believe that other companies will make similar strategic decisions about C. Already, C is taught in most college computer science curriculums, and is replacing older languages in many. And almost every computer introduced to the market now has a C compiler.

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